

MACWORLD

November 1988 \$3.95

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The Macintosh® Magazine

The Virus Threat

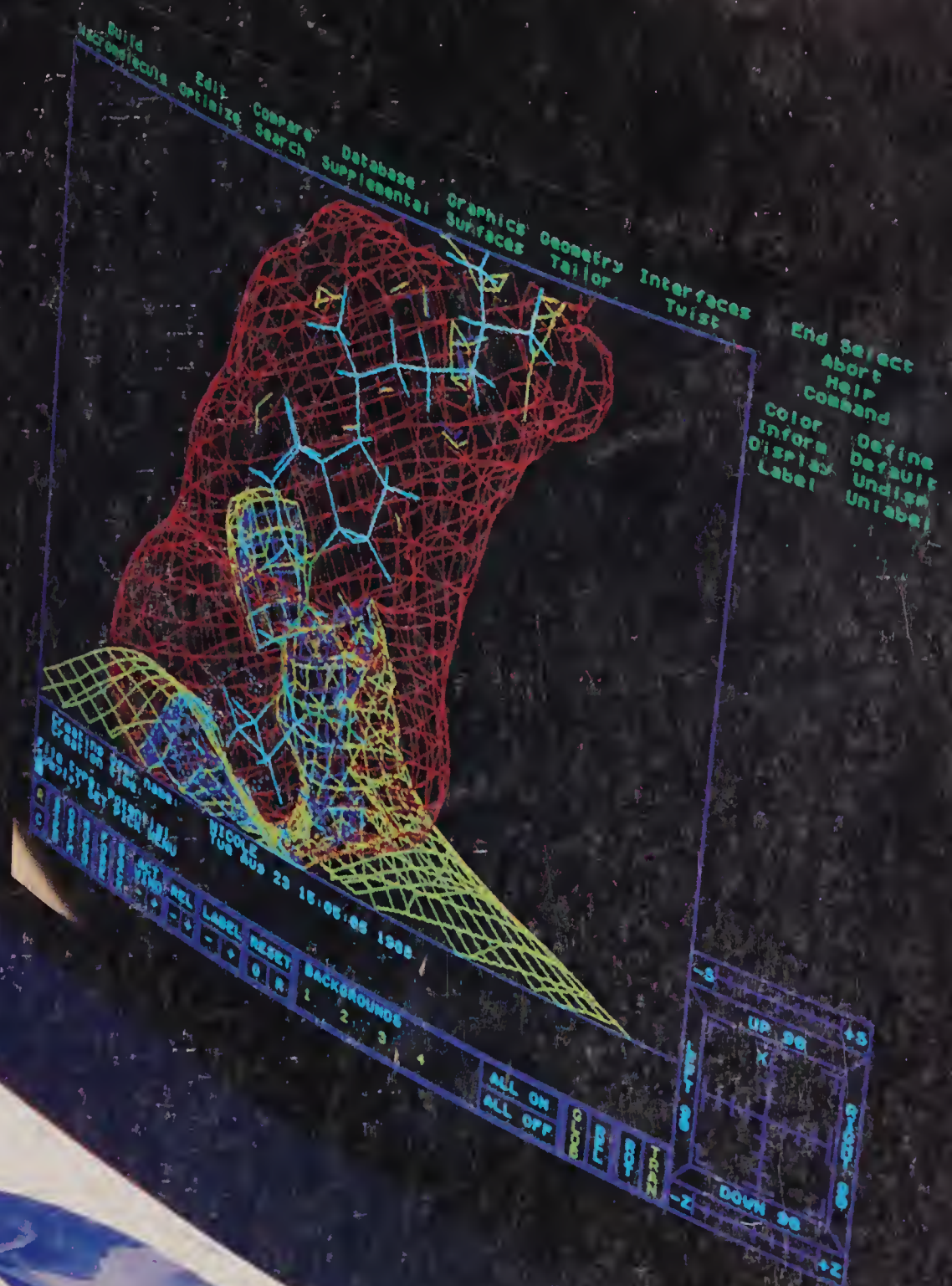
How to protect your Mac

**Word, WordPerfect,
and FullWrite: How
They Compare**

**Best HyperCard
Stacks of 1988**

**Backup: Four
Easy Solutions**

**Buying Your First Mac
What You Need to Know**



The fastest way to g

We have yet to meet the word processor that's perfect for everyone right out of the box.

Which is why we've built into Microsoft Word version 3 the unique ability to be customized to fit the way you work.

From modifying menus to filing away frequently used formats to designing your own dictionary, Word gives you more ways to turn our word processor into your word processor.

Don't like what's on the menu? Change it.

Menus should list the fonts and formats you use all the time. Not the ones you hardly ever use.

So you'll appreciate how easy it is in

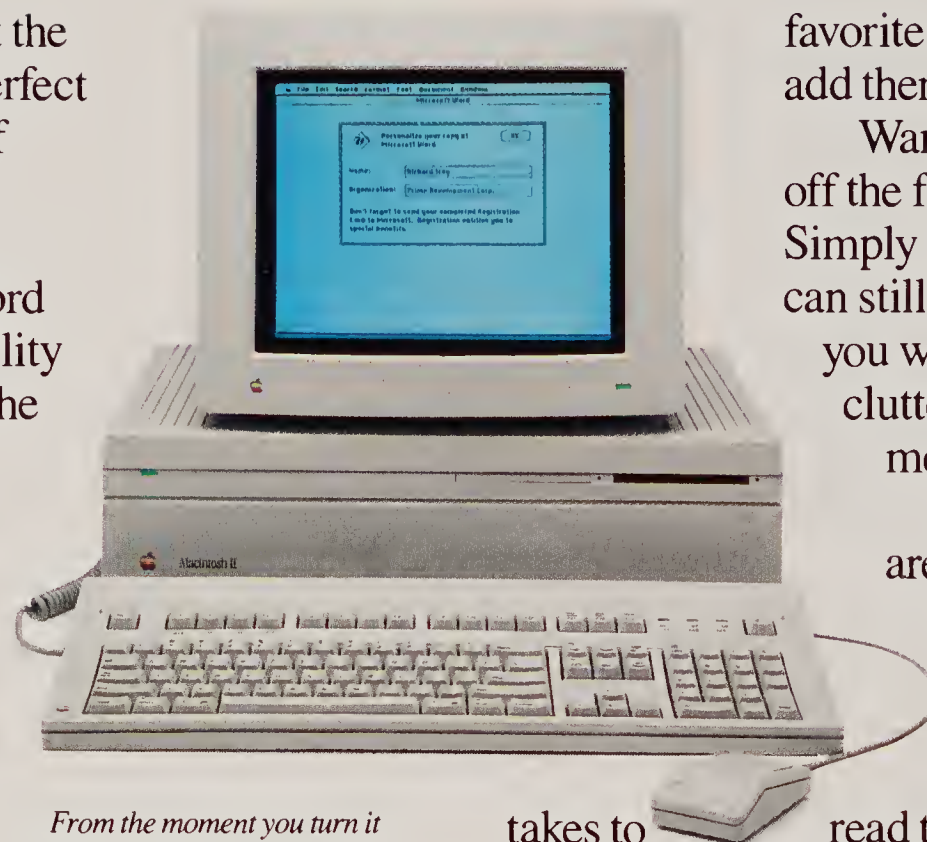
Font	
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Monaco	
✓New York	
Times	
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9 Point	
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5 Point	
7 Point	
9 Point	
11 Point	
13 Point	
15 Point	
17 Point	
29 Point	
48 Point	
64 Point	

Microsoft Word makes it easy to create custom menus that list as many fonts as you want to work with.

Word to add the formats you want. And remove the ones you don't.

Want quick access to your LaserWriter® fonts, paragraph borders, or some other



From the moment you turn it on, Microsoft Word lets you know it's yours and yours alone.

takes to

You might say they're your passport to easier writing.

favorite format? Just add them to your menus.

Want to take Monaco off the frequent font list? Simply delete it. You can still use it whenever you want to; it's just not cluttering up your menu.

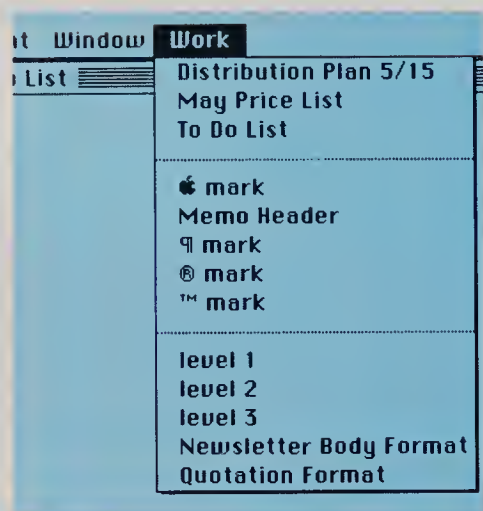
And Word's menus are so easy to customize, you can make a change in less time than it

read this sentence.

Format	Format
Show Ruler	Show Ruler ⌘R
Character...	Character... ⌘D
Paragraph...	Paragraph... ⌘M
Section...	Section...
Styles...	Styles... ⌘B
Define Styles...	Define Styles... ⌘T
✓Plain Text	Plain Text
Bold	Double Underline
<i>Italic</i>	Strikethru
<u>Underline</u>	Hidden
Outline	Superscript 2.5pt
Shadow	Side-by-Side
	Page Break Before
	Keep With Next ¶
	Keep Lines Together
	Border Box
	First Page Special
	Columns 3
	Show Hidden Text

If you find yourself frequently using certain character or paragraph formats, you can add them to Microsoft Word's Format Menu. And you can take away others that you hardly ever use.

et through customs.



Word is the only word processor for the Macintosh® that lets you create your own menu. List your most frequently used filenames, glossaries, and styles on a Work Menu where you can get to them quickly.

Add a menu. Subtract steps.

Microsoft Word lets you add a special menu that saves so much work it's called the Work Menu.

Add a Work Menu to the typical office and you may just see

some very atypical productivity increases.

That's because the Work Menu saves steps by putting your favorite formats, boilerplate text entries, and even document names a quick mouse click away.

More changes for the better.

There are lots of other ways you can make Word yours and yours alone.

Create your own custom styles—like that tricky boxed paragraph with the 13-point line spacing, tight letterspacing, and boldfaced, italicized text. And re-use it instantly for consistency in one document or across several.

You can also have your own glossary for storing text that you'd rather not retype every time you need it. Part 1(b) of the standard agreement, for instance.

And, of course, you can even customize Word's 80,000-word dictionary by adding your own unique terms.

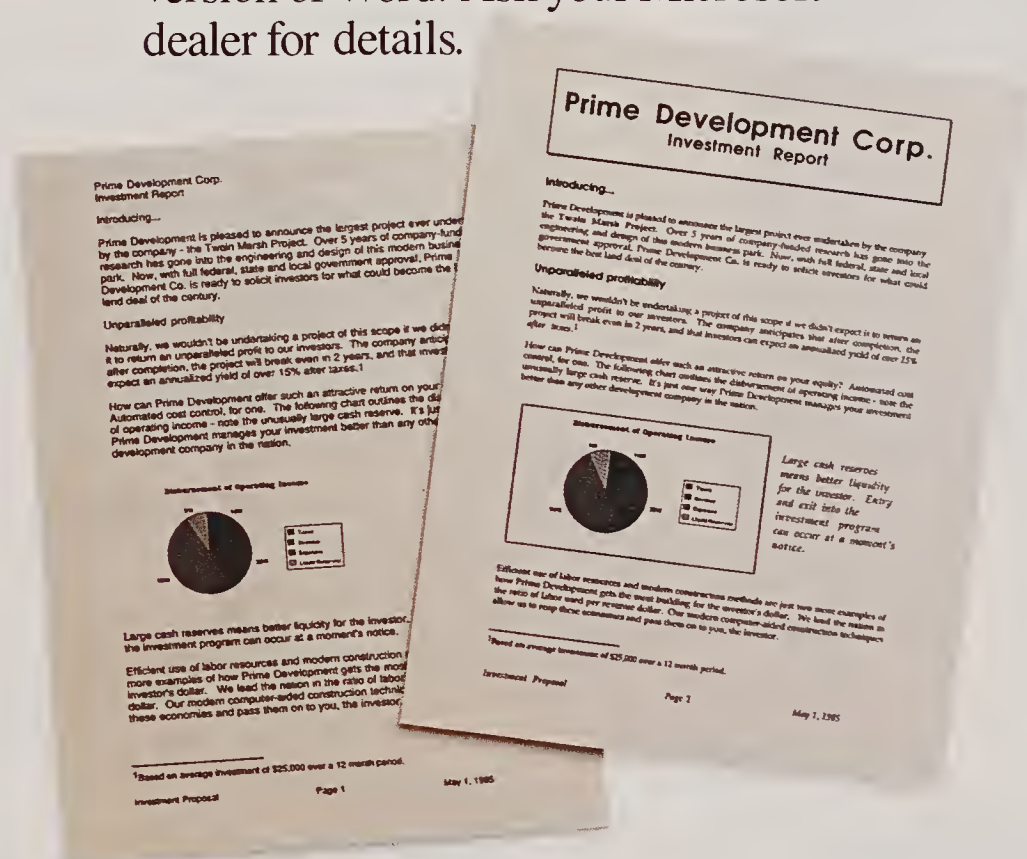
Make our Word your Word.

Ask your local Microsoft dealer to show you all of the ways Word is designed to fit you better than any other Macintosh word processor. Call (800) 541-1261, Dept. F76 for the names of dealers near you.

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Get Microsoft Word 3.02 now and you'll also get a free thesaurus, free macro program, and free upgrade to the next version of Word. Ask your Microsoft dealer for details.



One of the fastest ways to produce customized output is by using Word's style sheets. They let you change from one format to another with just a click of the mouse.

Microsoft Word



MACWORLD

November 1988

The Macintosh® Magazine



On the Cover

Computer viruses have infected Macintosh systems and applications. See tips for safeguarding your Mac on p. 92. (Photo by Fred Stimson.)

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- **Color Images Find Their Avalon**
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Plus, ray tracing comes to the Mac, communicating with HyperCard, Macs at the Demo Convention, and more.



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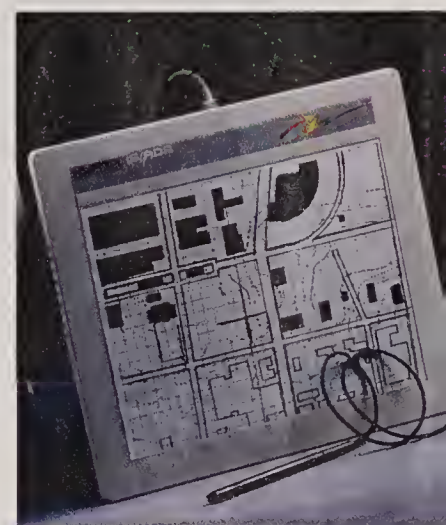
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Are any of the alternatives to the ImageWriter right for you? (p. 279)

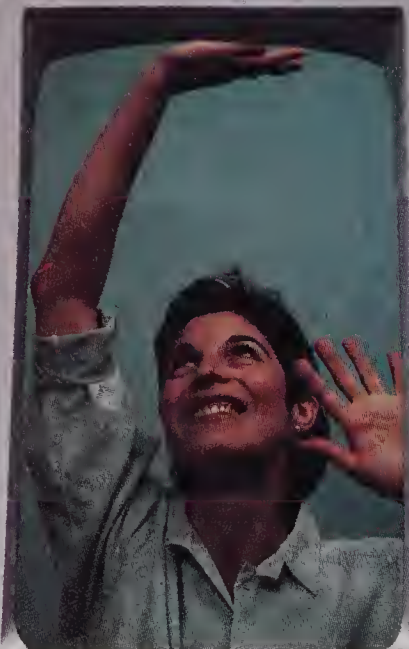
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The Kurta IS/ADB tablet and software lets you bypass the mouse (p. 168).

Take The Long View



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MacUser, March 1988 ★★★★★



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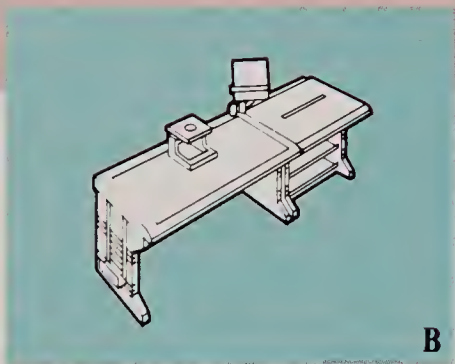
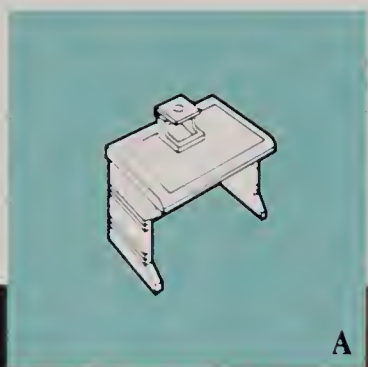
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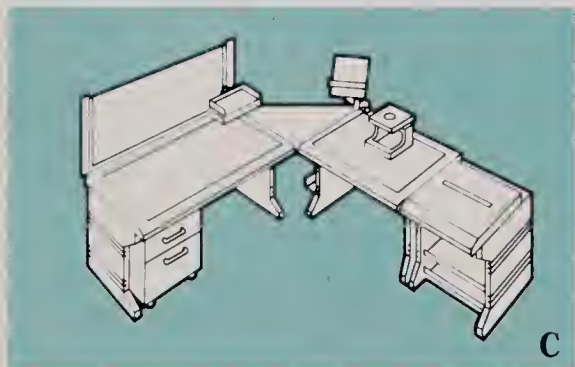
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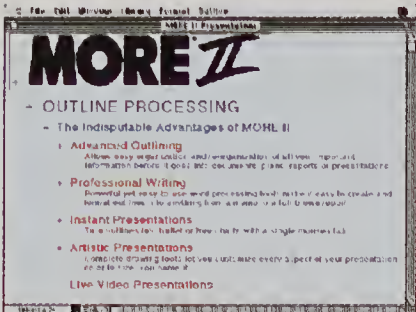
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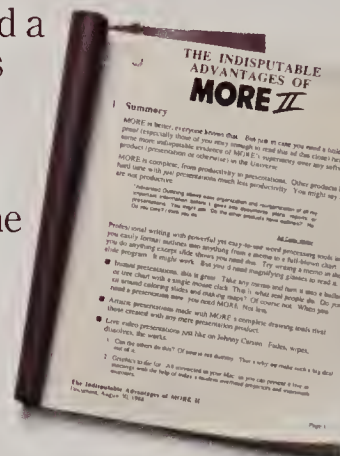
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Here It Is: 68030

► It's here at last: a Mac II with the Motorola 68030 CPU, running at 16 MHz, and the 68882 floating-point coprocessor. Although the 030 CPU runs at the same clock speed as the current 68020 CPU, the 030-equipped Mac II is expected to run from 10 to 15 percent faster than the 020-equipped Mac II because of the 030 chip's superior architecture. The CPU itself contains caches (separate areas of very fast memory) for both data and instructions, and runs with one less wait state than the 020. The 68882 floating-point coprocessor will double the floating-point math performance of Mac IIs using the 68881.

The 030 contains a Paged Memory Management Unit (PMMU) on the chip, so the new systems will support virtual memory and true multitasking—as soon as the new Macintosh operating system software is released. Until then, only the A/UX operating system will be able to take advantage of the 68030's memory management functions.

Apple is also offering an equally important new 1.4MB floppy disk drive that can read both 720K and 1.4MB MS-DOS–formatted floppies as well as 400K, 800K, or 1.4MB Mac disks. With version 1.1 of Apple File Exchange software, it can read, write, and format either MS-DOS or Macintosh operating system floppies.

The new Mac II is offered with the 68030 and 68882, 4MB of RAM, and the 1.4MB

floppy drive. An internal 80MB hard disk is optional. If you already have a Mac II, there are three ways to upgrade: purchase the new 1.4MB floppy drive and the associated controller chip; buy the new logic board; or add the Motorola 68851 PMMU chip.

GraphistPaintB&W

► The sophisticated image-manipulation of Aba Software's GraphistPaint II Color will soon be available in a black-and-white version for a 1MB Mac Plus, SE, or II. The program, GraphistPaint B&W, replicates every feature of its color counterpart except for the color, gray-scale imaging, and digitization. Both programs offer rapid multiplication, movement, and distortion of images, and the ability to wrap flat images around spheres.

GraphistPaint B&W has all the standard painting tools, and it supports most of the standard file formats for import and export: Paint, PICT, and TIFF. Its new features include Stencil—for sizing, constructing lines, and encrusting—and Pixel Brush, which allows you to create a paintbrush from a drawing.

GraphistPaint II Color and GraphistPaint B&W can exchange files, so users of GraphistPaint B&W can colorize their black-and-white creations later on a Mac II. For further information, contact

your dealer or Aba Software, 41 Great Valley Pkwy., Malvern, PA 19355.

80MB Tape Backup

► Irwin Magnetics is now shipping the highest-capacity minicartridge tape backup system for the Mac. The Irwin Model 5080 can back up as much as 80MB of hard-disk data on a single, standard DC 2000 minicartridge. When used in conjunction with Irwin's other tape backup systems, it permits data transfer between Macs, IBM PS/2s, and PCs through the simple exchange of pop-in minicartridges.

The self-powered, SCSI-interface Model 5080 features easy-to-use EzTape Iconographic software and error-correction technology. It supports backup functions across all popular local area networks, including AppleShare and TOPS. Any file made available on the network can be backed up remotely by any networked station.

EzTape Iconographic software is compatible with Multi-Finder, and a version for Apple's A/UX on the Mac II will soon be available.

The list price of \$1695 includes EzTape software, SCSI interface, 256K RAM, and self-contained power supply.

CL/1 Language Specs Published

► Network Innovations Corporation, an independent subsidiary of Apple, has published the CL/1 Connectivity

Language Description, a set of specifications that provides uniform access to shared data from within desktop applications, masking the differences among host operating systems, DBMS brands, and network protocols. CL/1 is the first step toward making transparent access to shared data a standard feature of packaged software. The first CL/1 connection will provide access from within Macintosh applications to host data on Digital VAX systems.

The CL/1 is a key part of Apple's strategy for connecting Macs to corporate information beyond the desktop. Publication of the CL/1 Connectivity Language Description kicks off CL/1 development efforts in earnest. For further information, call Network Innovations, 408/257-6800.

A New Toolbox for Communicators

► Apple has announced the Communications Toolbox, an extension of the current Macintosh Toolbox routines that will allow applications to easily manage communications functions. The Communications Toolbox supports multiple communications channels and provides tools to manage serial ports and the Apple Data Stream protocol. Third-party products are expected to provide tools for SNA, TCP/IP, and DECnet communications. The Communications Toolbox also provides stan-

(continues)

dard interfaces for terminal emulators, and a standard set of file-transfer tools including routines for data encryption and file-format conversion.

Cost-Cutting FaxScan

► MDIdeas is now offering FaxScan for the Mac, a product designed for desktop publishers and people with small businesses who are unable to afford a scanner. FaxScan can transform a stand-alone facsimile machine into a 150-to-300-dpi scanner to import pictures and documents from hard copy. It can also turn a computer into a facsimile receiver, providing half a fax for one-third the cost.

FaxScan connects to a standard stand-alone facsimile machine and to a personal computer via an RS-232C serial interface. By simulating another fax, FaxScan establishes communication with a facsimile machine directly through its phone line. After establishing communication, FaxScan receives data from the facsimile machine and transfers it to the computer in a TIFF or PICT format.

FaxScan is compatible with all stand-alone facsimile machines using Group 2. It works with any Mac, is compatible with MultiFinder, and has an external power supply for use in other countries. It lists for \$299.95 and is available through dealers or direct from MDIdeas. For further information, call MDIdeas, 1163 Triton Dr., Foster City, CA 94494, 415/573-0580.

ResEdit Wrap-Up

► Apple recently released interim version 1.2b2 of its resource editor, ResEdit, and plans to ship finished version 1.2 in November or December. The interim version reflects eight months of bug-fixing by a five-person team at Apple with an ongoing mandate to improve ResEdit. It also includes some new resource templates for international localization, and a 45-page manual. The finished version will have more bug-fixes, new international resource editors, and a 100-page manual.

The interim version is available from online information services and from many user groups that maintain software libraries. Members of APDA (Apple Programmer's and Developer's Association) can order it from APDA for \$10. For APDA membership information, write to 290 S.W. 43rd St., Renton, WA 98055, or phone 206/251-6548.—*Lon Poole*

Cloning the Mac

► Cloning the Macintosh. Many companies think about it. Some have even tried—for example, the Brazilian company Unitron. But Apple's threats of legal action have always put a damper on the idea.

Now, Taiwan-based Happy Joiner Company has shown two Mac-compatible gate-array chip sets at the Computex trade show in Taiwan. The gate arrays include a real-time clock chip and a floppy disk controller that's capable of managing two 800K Mac floppy drives. The company, an uninterruptible-power-supply (UPS) vendor, hasn't cloned the Mac ROM yet. But according to *Asiatrends*, a newsletter on Asian sources of com-

puter products that is published by Trade Media in Hong Kong, Happy Joiner also exhibited a prototype Mac-compatible at the show.

Since Happy Joiner maintains that the chip sets don't violate any existing Apple copyrights, the company apparently isn't worried about Apple lawsuits. Happy Joiner doesn't plan on selling Mac-compatible computers itself, but it will sell its chip sets to anyone who wants to design legal Mac ROM and legal software to run it.

Group Editing Online

► Mainstay is now offering Markup, a multiuser application for online group editing of any type of Mac document. You can edit any document, without the application that created it, by placing transparent overlays on original documents. Each group member can edit and mark up a separate layer and view layers edited and marked up by others. The master reviewer can then use all layers to produce the final document.

Markup's editing tools include a text tool for free-standing text; a note tool for pop-up notes; tools for lines, arrows, and rectangles; and a lasso. They can be used to edit documents containing text, drawings, art, scanned photos, spreadsheets, and other types of information.

Markup supports networks like AppleShare, and workgroups composed of dispersed members sending files via disk or telecommunications. For further information, contact Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301, 818/991-6540.

Fast Color Printing

► Sharp Electronics now offers the JX-730, a B-size, plain-paper, high-resolution, color ink-jet printer. The JX-730 has twice the speed of Sharp's JX-720, and 225 percent more resolution. It also features a larger printing area, a larger print buffer, the capability to act as a monochrome text printer, and separate ink reservoirs (which reduce printing-cost-per-page because ink-packs do not have to be discarded before they are fully exhausted).

The JX-730's print speed is one minute per page. It offers wide-carriage printing and, depending on the software, can produce unlimited colors. There are three paper-feed options: roll paper, tractor, and cut sheets.

For further information, contact the Systems Division at Sharp Electronics Corp., Sharp Plaza, Mahwah, NJ 07430, 201/529-9500.

Improving Mainframe Communications

► Digital Communications Associates (DCA) has announced an applications programming interface (API) for its MacIRMA boards that allows applications developers to easily create Macintosh interfaces to mainframe-based applications. Applications written in languages like C or HyperTalk, or in a procedural language from a database like 4th Dimension, can access any of the 32 API calls. DCA's API provides a consistent, high-level interface between an application and the MacIRMA hardware and is compatible with DCA's IRMA API for MS-DOS personal computers. □

PRESENTING THE WRITEMOVE
PORTABLE PRINTER.

Most printers are sentenced by their own sheer bulk to lifelong confinement on a desktop.

But now GCC Technologies™ has created a printer for the Macintosh® with considerably more freedom than that. It's called WriteMove™: the "biggest" printer ever to come in an incredibly small package.

WriteMove weighs a scant three pounds. It measures just 2"x6½"x10¾". (Any smaller and you couldn't get the paper in.)

But it's the only ink jet printer of *any* size that gives you almost unlimited freedom to reduce and enlarge type and documents. Because it's the only one with outline fonts—imaging software that provides functionality otherwise available only with laser printers.

As a result, you can use WriteMove to compose documents with word processing software like Microsoft® Word, or desktop publishing programs like PageMaker®. And then silently print them out at 192-DPI resolution. In other words, you get much

higher print quality than the ImageWriter® II, for not much more money.

Which could bring a whole new meaning to the phrase "freedom of the press."

To exercise that freedom, see your authorized GCC Technologies dealer for a WriteMove demonstration. For the one nearest you, call (617) 890-0880.*



*In Canada, (800) 263-1405 ©1988 GCC Technologies, Inc. GCC Technologies and WriteMove are trademarks and the GCC Technologies logo is a registered trademark of GCC Technologies, Inc. Macintosh and ImageWriter are registered trademarks of Apple Computer, Inc. PageMaker is a registered trademark of Aldus Corp. Microsoft is a registered trademark of Microsoft Corp. Suggested manufacturer's retail price: \$699

INTRODUCING THE MOST INGENUOUS PORTABLE PRINTER SINCE THE PENCIL.



Now MACINTOSH AND WANG CAN COMMUNICATE AND NOTHING GETS LOST IN THE TRANSLATION

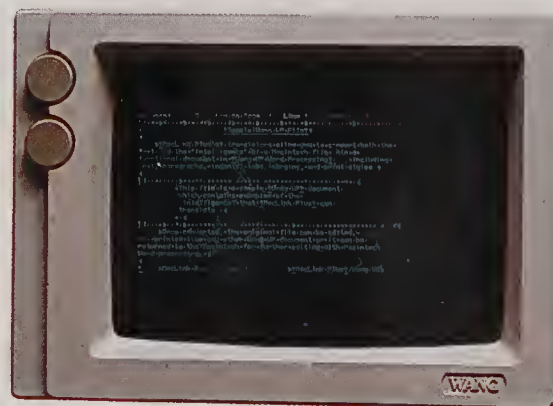


Transferring files from one system to another is somewhat pointless if you spend most of your time re-formatting the data.

Which is why we introduced

MacLinkPlus for Wang. Whether you're running a Wang VS system, an OIS or a Wang PC, MacLinkPlus provides a complete solution for document transfer and file conversion.

MacLinkPlus includes the entire collection of more than 40 translators — the key to accurate conversion of file formats such as rulers, indents, bold and plain text styles, margins, tabs, underlines, superscripts, subscripts, paragraphs, and tabular tables. If it looks a certain way on a Wang, it will look the same way on a Mac. And, of course, vice-versa. No time-wasting and difficult pre-conversion



Wang Word Processing



Microsoft Word

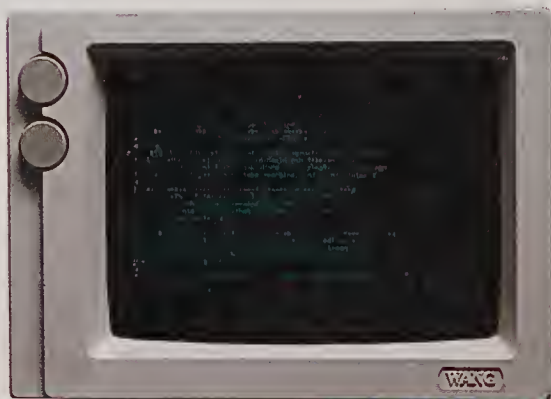
to ASCII or print files is necessary.

MacLinkPlus doesn't stop there, however. It offers full Wang VS Workstation capabilities, allowing easy access to Wang word processing, data processing and electronic mail. All 32 Wang Workstation functions can be executed through familiar Macintosh menus or command keys, and you'll even be able to use the mouse on Wang displays.

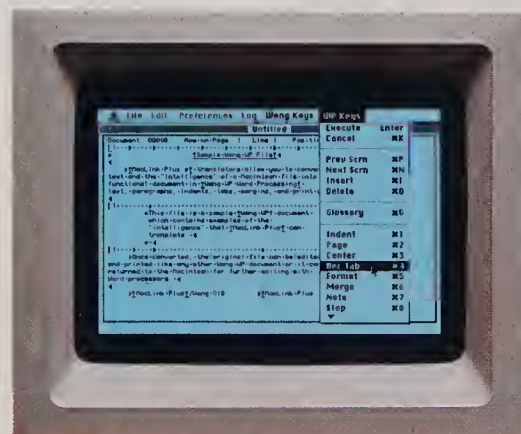
Software for the Macintosh, software for the Wang (8" or 5.25"), software for the PC and a direct connect cable (you can use a Hayes or compatible modem if you prefer), is included in the MacLinkPlus package; everything you need to be up and running in minutes.

So call (203) 268-0030 for your nearest DataViz dealer, because no matter which Wang system you're using, there's a MacLinkPlus solution to connect it to the Mac.

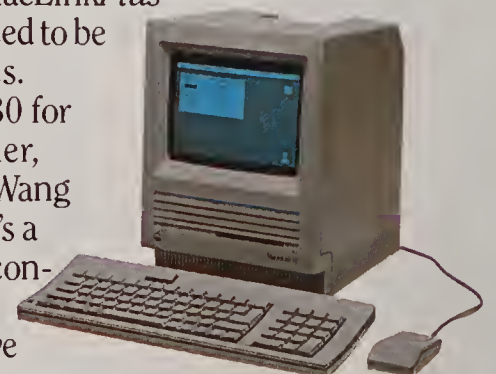
Who says you can't have the best of both worlds.



Wang 2110 Terminal



Macintosh 2110 Terminal Emulation



DATAVIZTM MACLINKPlus/Wang

35 Corporate Drive
Trumbull, Connecticut 06611

Circle 281 on reader service card

HOW FAST CAN YOU MAKE AN APPLETALK?

Up to three times faster. With the new TOPS FlashBox.™

Most people wouldn't change a thing about their AppleTalk® network. Except to make it faster.

Now you can do that — easily and inexpensively. With FlashBox.

Simply plug FlashBox into the back of any networked Macintosh®. And in a flash, information will speed along your existing twisted-pair cabling (such as Apple's LocalTalk™ or regular telephone wire) at the FlashTalk™ speed of 770Kbps— up to three times the AppleTalk data rate.

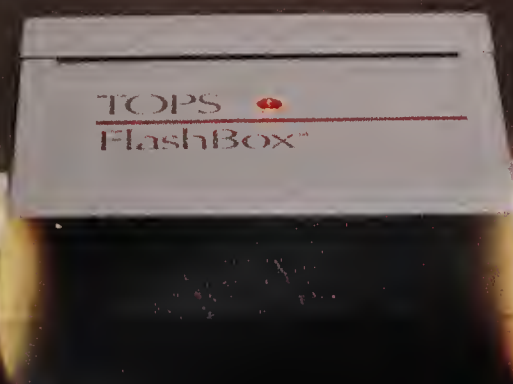
What's more, FlashBox is only \$189 per node, and can be installed on only those Macs you want. And because FlashBox can communicate at both FlashTalk and AppleTalk rates, it will automatically select the right speed to talk to any other Mac, PC, LaserWriter® or peripheral on your network.

In fact, you don't even need to be running TOPS — FlashBox can also quicken the pace of AppleShare®, InBox™ and multi-user applications. And networked PCs equipped with a FlashTalk compatible card (such as the TOPS FlashCard™) can talk with Macs at FlashTalk speed.

Only FlashBox can make AppleTalk faster without putting you through major changes.

So call your nearest TOPS dealer. Just dial 800-445-TOPS (or 415-769-8700 from outside the U.S. and Canada). Or drop a card to TOPS, 950 Marina Village Parkway, Alameda, CA 94501.

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A Sun Microsystems Company



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Telecommunications software for the Macintosh, a new version.

Soar to New Highs, Effortlessly

When Software Ventures set out to create MicroPhone, it had a simple mission: to develop the most intuitive communications software ever written. Indeed, when MicroPhone was born, it was universally hailed as a breakthrough in communications software. A product so friendly, it turned novices into experts. So sophisticated, it became, in the words of MacUser, a power user's delight.

MicroPhone is a legend. One of those precious software creations that single out the Macintosh as a superior computing machine.

With MicroPhone II, Software Ventures has set out to surpass itself: redefine power in telecommunications for years to come.

MicroPhone II is so revolutionary that PC Magazine was moved to say: "MicroPhone II is arguably the best

comm software ever written." We won't have it any other way. MicroPhone II. The freedom to be yourself. At the top.

Critics' Choice

Stewart Alsop, P.C. Letter:

"MicroPhone . . . sets the standards that general-purpose communications software will have to follow."

The New York Times:

"MicroPhone is a breakthrough in communications software . . ."



S O F T W A R E
V E N T U R E S

2907 Claremont Avenue Suite 220 Berkeley CA 94705

415-644-3232

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Let's Get Technical

MultiFinder compatible. Supports background file transfer and script execution. Offers a full-featured script language: variables, counters, and expression-analyzer for string and arithmetic operations. Scripts allow: control of all communications settings; screen addressing and text editing; filtering of incoming text.

Supports import and export of scripts as text files. Allows control of PBX's, Hayes and non-Hayes modems through flexible modem drivers. Runs at 50 to 57,600 baud. Emulates DEC VT52, VT100, and TTY type terminals. Mac II and LaserWriter compatible. Works with all Mac large screen monitors. Supports the extended keyboard. Built-in text editor. Includes Glue, licensed from Solutions, Inc.

Circle 48 on reader service card

The Expanding Mac Universe



The Mac is clearly light-years ahead of the PC pack. It should continue exploring "the final frontier" like there's no tomorrow.

The Macintosh software and application universe is expanding, and no cluster of OS/2s or Presentation Managers (the yet-to-be-released Mac look-alike graphics environment) in the IBM galaxy will be able to deflect Apple's path. I think it's cosmically ironic that companies like Microsoft, IBM, and Hewlett-Packard are attempting to recreate the Macintosh's graphic interface as if the Mac were standing still. By the time they catch up to the light from that galaxy, the Mac will be 10 trillion light-years away.

They simply have too much to catch up with. Right now on the Mac side, there is a revolution going on in desktop presentations and desktop publishing. Even desktop video is coming on strong. Clearly, the Mac is the big winner in all three areas. It's already far ahead in graphics, and it's doing well in business applications.

There are a few space-cases in the computer industry who believe that when Presentation Manager is here, Apple will be yesterday's weather satellite. That's a joke. Presentation Manager will be a platform without any software to speak of, while the Mac already has thousands of applications and all kinds of creative energy propelling it. Remember when the shoe was on the other foot? In 1984 there was very little software for the Mac, and a lot of questions about its viability. Now, the situation has changed so dramatically that if IBM is really serious about getting into this space race, it should consider licensing the Mac from Apple. That's probably the best way it can compete.

Meanwhile, wouldn't it be great if Apple were confident enough about its future to quit the madness of this lawsuit against Microsoft and Hewlett-Packard for allegedly copying the Macintosh screen display? As it happens, though, Apple either is not confident enough, or is simply being defensive, and the suit is still lumbering along.

Here's a recap of some of the case's more memorable twists and turns. Apple's lawyers had been working for Hewlett-Packard on another case when Apple filed its copyright-infringement suit, so the federal judge disqualified the lawyers. Then it was revealed that the same judge who threw out Apple's lawyers not only has a son who works for Hewlett-Packard, but in earlier cases has made judgments in HP's favor, as well. So the heat is on to disqualify him, too. Meanwhile, the judge has delayed the trial until August 1989.

That delay would seem to help Apple's case, since Microsoft and Hewlett-Packard may be hamstrung in their efforts to develop much of anything until the matter is settled. In addition, the U.S. Copyright Office recently ruled that a software copyright protects the display on computer screens, which would seem to reinforce Apple's case. As Richard Glasgow, the Copyright Office's assistant legal counsel, has stated, "We think the screen will be protected, no matter what the code" used to create it.

Announcement of this ruling caused Apple and Lotus stock-market shares to go up. (Let's not forget that Lotus is still mired in its "look and feel" lawsuit against various competitors.)

Despite all of these legal contortions, Apple doesn't have much to worry about in the long run. It's going to continue to be enormously successful. There's no need to get hooked on the industry's paranoid fear that OS/2 and Presentation Manager are meteorites on a collision course with Apple. There's nothing nebulous about it: the Mac is not just an idea whose time has come. It's a machine whose universe is expanding. □

THIS IS WAY TOO EASY. UNSURPASSED NUMBER-CRUNCHING POWER. CHARTS SO GRAPHIC, THEY JUMP OFF THE SCREEN INTO PAGE PERFECT PRESENTATIONS. YOU'RE ACTUALLY LOOKING FORWARD TO YOUR NEXT MEETING. BECAUSE YOU'RE NOT JUST GOING TO SHOW THEM NUMBERS. YOU'RE GOING TO WIN THEM OVER WITH WINGZ.

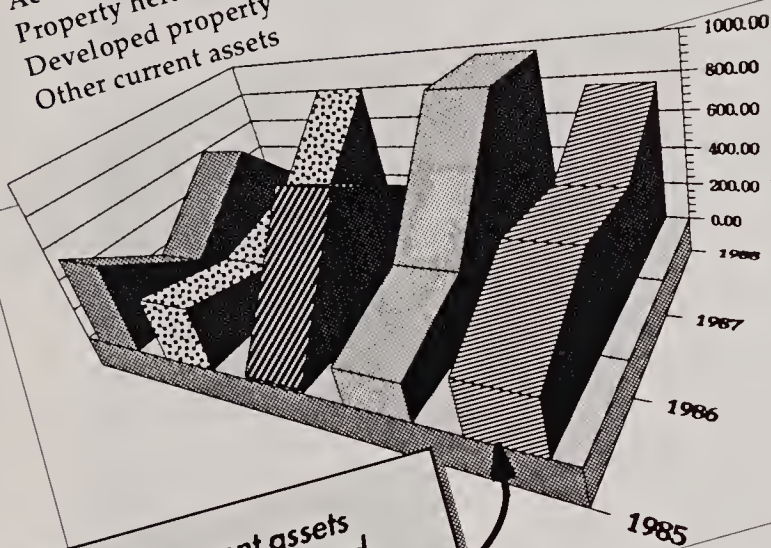


United Wares Assets

UW

Current Assets
Accounts receivable
Property held for resale
Developed property
Other current assets

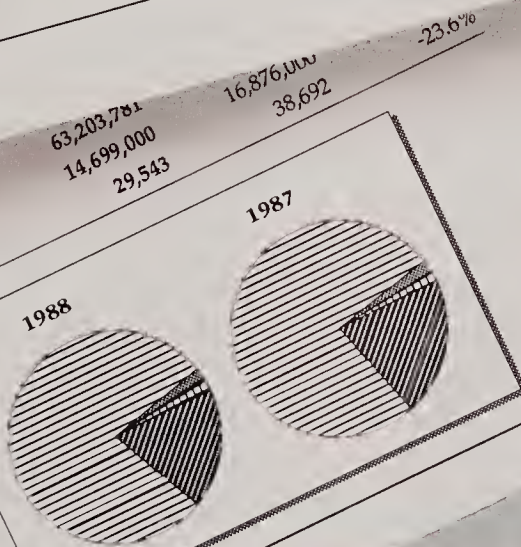
	1985	1986	1987	1988
Current Assets	550.60	211.73	637.61	115.67
Accounts receivable	372.19	245.66	365.33	798.15
Property held for resale	21.47	737.36	443.78	13.02
Developed property	204.43	340.20	973.76	950.67
Other current assets	287.61	533.20	476.00	746.98



Other current assets
include undeveloped
properties owned by
United Wares.

Long-term debt
Shareholders' equity
Per common share
Common shares outstanding
Shareholders of record
Employees

Working capital
Property, plant and equipment
Long-term debt
Shareholders' equity
Per common share
Common shares outstanding
Shareholders of record
Employees



OMB No. 1545-0085
social security no.

social security no.

cy Act and
k Reduction
, see page 31.

"Yes" will

tax or

reduce your refund.

number above

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Spouse

THE ULTIMATE PRESENTATION SPREADSHEET.

WINGZ™

INFORMIX

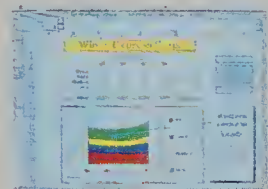
INSIDE WINGZ

Spreadsheet

- **Worksheet size:** 32,768 rows by 32,768 columns.
- **Hierarchical menus:** Certain menu items bring up a sub-menu.
- **Speed:** Average recalculation is substantially faster than other spreadsheets.
- **Sparse matrix memory management:** Wingz allocates memory only for cells that contain data, for most efficient memory use.
- **Minimal recalculation:** Wingz recalculates only cells affected by a worksheet change, reducing calculation time.
- **Calculation options:** Wingz has automatic, and manual recalculation, as well as natural, row, column, and iterations.
- **Linking:** Any formula can refer to any cell on any worksheet in memory.
- **Naming Capability:** Identify cells by names rather than cell locations.
- **Fill:** Fill a range with numeric or time series information.
- **Consolidation:** "Paste Special" command pastes formulas, values, formats. Combine information from two ranges on a single worksheet or from two different worksheets.
- **Insert, Delete, Cut, and Copy:** Applicable for any range of cells. Paste formulas, formats, values.
- **Auditing:** Built-in tools check cell relationships.
- **Security:** Protect your Wingz worksheets with passwords (read/write or read only) plus data encryption.
- **Annotated Cells:** Add notes to any worksheet. Then hide, view, or print them.
- **Adjustable Rows and Columns:** Rows and columns can be resized.
- **Cell Selection:** Select discontinuous ranges of cells for manipulation.
- **Find:** Search worksheet for specific text, value, formula, or other criteria.

Built-in functions include:

Business functions:
 BDNDFPRICE(yld,value,rate, ytm, pmts), BDNDFYTM(price,value,rate, ytm,pmts), CTERM(int,k,pv), ODB(cost,salvage,life,period), FV(pmt, int,term), FVLPmt,int,term), INTEREST(prin,pmt,term), IRR(guess,range), LOANTERM(prin, pmt,int), NPV(int,range), PMT(prin,int,term), PRINCIPAL(pmt,int, term), PV(pmt,int,term), PVLPmt,int,term), RATE(fv,pv,term), SLN(cost, salvage,life,period), SYD(cost,salvage,life,period) TERM(pmt,int,fv).



What you see is what you get with Wingz. Presentation graphics, spreadsheet data, and text all on one page.

Date/Time functions:

ADATE(datetime,picture), ADDDAYS(datetime,days), ADDHOURS(datetime,hours), ADDMINUTES(datetime,minutes), ADDMONTHS(datetime,months), ADDSECONDS(datetime,seconds), ADDEARS(datetime,years), ATIME(datetime,picture), CMDNTH(month), CWEEKDAY(weekday), DATE(year, month,day), DATEVALUE(datestring), DAY(datetime), DAYNAME(datetime), HOUR(datetime), MINUTE(datetime), MONTH(datetime), MONTHNAME(datetime), NDW), SECOND(datetime), TIME(hour, minute, second), TIMEVALUE(timestring), YEAR(datetime).

Logical functions:

FALSE(), IF(condition,x,y), ISBLANK(cell), ISERR(x), ISNA(x),

ISNUMBER(x), ISRANGE(x), ISSTRING(x), TRUE(),

Statistical functions:

AVG(itemlist), COUNT(itemlist), MAX(itemlist), MIN(itemlist), STD(itemlist), STDEV(itemlist), SUM(itemlist), SUMSQ(itemlist), VAR(itemlist), VARIANCE(itemlist).

Database functions:

DAVG(input,offset,criteria), OCCOUNT(input,offset,criteria), OMAX(input,offset,criteria), OMIN(input,offset,criteria), OSTDEV(input,offset,criteria), OSUM(input,offset,criteria), DSUM(input,offset,criteria), DVAR(input, offset,criteria), DVARIANCE(input, offset,criteria).

Text functions:

CHAR(x), CODE(text), COLLATE(text1,text2), CONTAINS(text, searchtext), CURRENCY(x), EXACT(text1,text2), FIND(searchtext, text, start), LEFT(text, n), LENGTH(text), LOWER(text), MATCH(text,searchtext,start), MID(text,start,n), N(range), NFORMAT(x,format), PRDPER(text), REPEAT(text,n), REPLACE(text,start,n,newtext), RIGHT(text, n), S(range), STR(x,n), STRING(x, n), TRIM(text), UPPER(text), VALUE(text).

Spreadsheet:

CELL(), CELLTEXT(cell), CHOOSE(n,itemlist), COLS(range), ERR(), HLOOKUP(x,range,column), INDEX(range,column,row), INDIRECT(text), MAKECELL(column,row), MAKERANGE(column,row), ROWS(range), VLOOKUP(x,range,row).

Numeric functions:

ABS(x), ACOS(x), ACOSH(x), ASIN(x), ASINH(x), ATAN(x), ATAN2(x,y), ATANH(x), COS(x), COSH(x), DEGREES(radians), EI(), EXP(x), EXPONENTIAL(x), FACTORIAL(x), GDAL(initial,result,formula), GUESS(), INT(x), LN(x), LOG(x), LOGN(x,logbase), MOD(x,y), NORMDIST(x,mean,standarddeviation), PI(), RADIANS

(degrees), RAND(), ROUND(x,n), SIGN(x), SIN(x), SINH(x), SORT(x), TAN(x), TANH(x), UNIFORM(x).

User-defined functions:

Create custom functions using HyperScript language.

Hundreds of HyperScript functions:

Hundreds of other functions are available through the HyperScript language. These functions fall into four basic categories: COLOR, ENVIRONMENT, CONTROL, and MISCELLANEOUS.

Presentation capabilities

Display Options: Print graphs, text, numbers, and clip art all on one page. Use all font types and sizes in your Macintosh system. Access up to 16 million colors and/or 38 patterns. Complete control of attributes such as background and foreground colors, fill patterns, object borders, etc. Variable row heights and column widths. Changeable grid color and size. Turn grids, row and column headers, entry bar, tool box, and worksheet off and on.

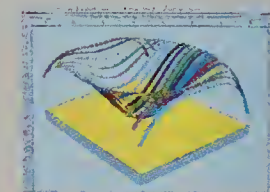
Alignment Options: Left, right, center, general.

Number and Date Formats: 14 number and date formats built-in: create customized formats.

Negative numbers can appear in red, or any other color you choose.

Text fields: Blocks of text (text fields) can be placed on the worksheet. Editing features include tab, indent, word wrap, search and replace. Change fonts and font attributes down to the individual character. Can reference formulas in a spreadsheet.

Object Orientation: Charts, free hand drawings, text fields and controls including HyperScript buttons are considered objects. Objects can be overlapped, covered, removed, resized, and repositioned in any order. Any number of objects can be attached to a sheet.



No Macintosh software makes it so easy to create such vivid 3-D graphics.

Graphics

Drawing Tools: Design objects with special drawing tools: Straight line, Arc, Circle, Square or Rectangle, and Polygon or Polyline.

Lines and Arrows: Adjustable line widths, 38 different fill patterns, and any combination of colors. Can be resized or repositioned anywhere on worksheet.

Graphic Elements: Graphic images, clip art, photographs, PICT files, etc. imported on the Wingz clipboard can be used.

Charts and Graphs

Chart types: Twenty basic chart types: both scientific and business

oriented: 2-D Bar, Line, Layer Step, Combination, Horizontal bar, Pie, HiLo; 3-D Bar, 3-D Line, 3-D Layer, 3-D Step, 3-D Combination, 3-D Pie; XY, Scatter, Polar, Wireframe, Contour, Surface. Unlimited number of graph types can be created through user modification.

Data smoothing:

User controllable. **Unlimited graphs per worksheet:** Multiple graphs can be created from either the same data or different sets of data within a Wingz worksheet.

3-D Graphs: Three dimensional graph options. Unlimited permutations of 3-D graphs through graph rotation, elevation, and variable perspective (distance) alterations.

Layout Options: Automatic or manual chart layout options.

Legends: Can be automatically created and labeled.

Axis scaling: Manual or automatic. Linear, logarithmic, or percent scales.

Grid display: User modifiable grid and axis.

Data Points: 32,768 data points per series.

Dynamic Linkage: Automatically redraws charts and makes appropriate changes in text fields when spreadsheet data changes.

Database

Use spreadsheet as a database: Allows for quick and easy organizing, filing, sorting, and retrieving of data in any spreadsheet.

Sort: Sort as many as 256 keys.

Operations: Find, Extract, Delete, and Sort.

Number of records: Up to 32,767 records. Actual size limited only by memory.

Database selection criteria: Extract or link the information you need.

Application Programming Language

HyperScript: Complete programming language: English-like. Event-driven. A series of commands can be executed by a single event such as the click of a button.

Programming features: Classic, powerful programming features include IF-THEN-ELSE, CASE statements, DO-WHILE looping, FOR-NEXT loops, PROCEDURES, Global and Local variables, complete set of drawing commands (2D and 3D), etc.

Customization: User-definable menus, advanced controls (buttons, slidebars, and number wheels), dialog boxes, and functions.

Buttons: Automate virtually any action by executing a HyperScript program.

Learn Mode: Allows recording of scripts for replay or edit purposes.

Import/Export Capabilities

Read and write files from other Macintosh and DOS spreadsheet programs, including: Excel (SYLK) or Lotus (JWKS, WK1), as well as DIF and ASCII file formats.

Printing

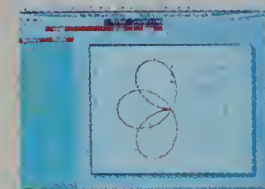
Print Preview: Shows entire page, its layout, and page breaks.

Page features: Headers, footers, titles, margins, print formulas or values.

Hide/Show features: Hide or show worksheet information, fixed titles, cell notes, text fields, grid lines, buttons and controls, graphics including lines, squares, etc.

Printers: Printers supported by the Apple print drivers, including LaserWriter, LaserWriter Plus, LaserWriter II, ImageWriter II, and ImageWriter LD printers. Wingz also supports a range of additional hardware including color printers which support PostScript and Apple QuickDraw Commands.

Color Printing Capability: Requires compatible printer or plotter and driver software.



Wingz can create dramatic engineering graphs that lend visual clarity to complex data.

Other Wingz features

Fully supports Macintosh user interface for increased ease of use. Utilizes all memory on any Macintosh.

Extensive keyboard interface utilizing Apple Extended keyboard function keys.

Comprehensive, on-line help. Help displayed on screen at same time as active worksheet. Multiple help windows may be open at one time. Network support with automatic file- and record-locking, and data encryption.

Wingz is not copy-protected.

Hardware and Operating System Requirements

Wingz requires a Macintosh Plus, SE, or II with one megabyte of memory, and two diskette drives or one hard disk. Two megabytes of memory is suggested when running MultiFinder. A hard disk is recommended.

Wingz supports the Macintosh operating system, and will run under system version 4.1 (Finder 5.5) or higher. Wingz also runs under MultiFinder.

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MacUser

"Although this category, unlike spreadsheets and word processors, had a lot of new players this year, one seemed to us to be the clear leader.

4th Dimension, the powerful first product from ACIUS, takes the kudos."

MacUser, February 1988 ■

"Congratulations! InfoWorld's readers have chosen 4th Dimension as the Product of the Year in the Macintosh Database Systems category."

Jonathan Sacks, InfoWorld, April 1988 ■

"I can't imagine a data-management problem that you won't be able to solve with 4th Dimension."

Steve Mann, Macintosh Today August 11, 1987 ■

"Users with no experience or interest in programming can build a barebones database in 4D's 'Design Environment' just by pointing, clicking, and naming files and fields."

"For searches and sorts - database operations that are performed interactively - 4D's performance curve is probably the best of the four programs (Omnis 3 Plus, Double Helix II, dBASE Mac, and 4th Dimension)."

David Brandt, MacWEEK, January 19, 1988 ■

"It will do everything you need, and then some, and will prove itself well worth the cost."

Jan L. Harrington, MacUser, November 1987 ■

"I'm convinced that many users of other Mac databases and even PC databases will want to switch over to 4th Dimension."

Adam Green, Macworld, July 1987 ■

"In general, Macintosh software is better than software for other personal computers..."

4th Dimension redefines those high standards."

Andrew Gore, The Macintosh Buyer's Guide, Spring 1988 ■

"4th Dimension from ACIUS, Inc. of Cupertino, California, outshines the other databases we tested both in number of features and in rich database development environment."

Don Crabb, InfoWorld, January 11, 1988 ■

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Letters

A forum for Macworld readers

Playing in Color

I've been unable to find even one really good, visually appealing color game for the Mac II. I will admit that Crystal Quest is a great game, but it gets boring after a while. Are there any decent Mac II games coming up soon?

David Klein
Houston, Texas

PCAI has a new color version of MacGolf (see October Reviews), Electronic Arts has just come out with Chuck Yeager's Flight Simulator designed for the Mac II, and Spectrum HoloByte has introduced Solitaire Royale, to name a few. —Ed.

Corrections

The address for Ashton-Tate, maker of Full Impact (Where to Buy, July 1988), is 20101 Hamilton Ave., Torrance, CA 90502-1319, 213/329-8000.

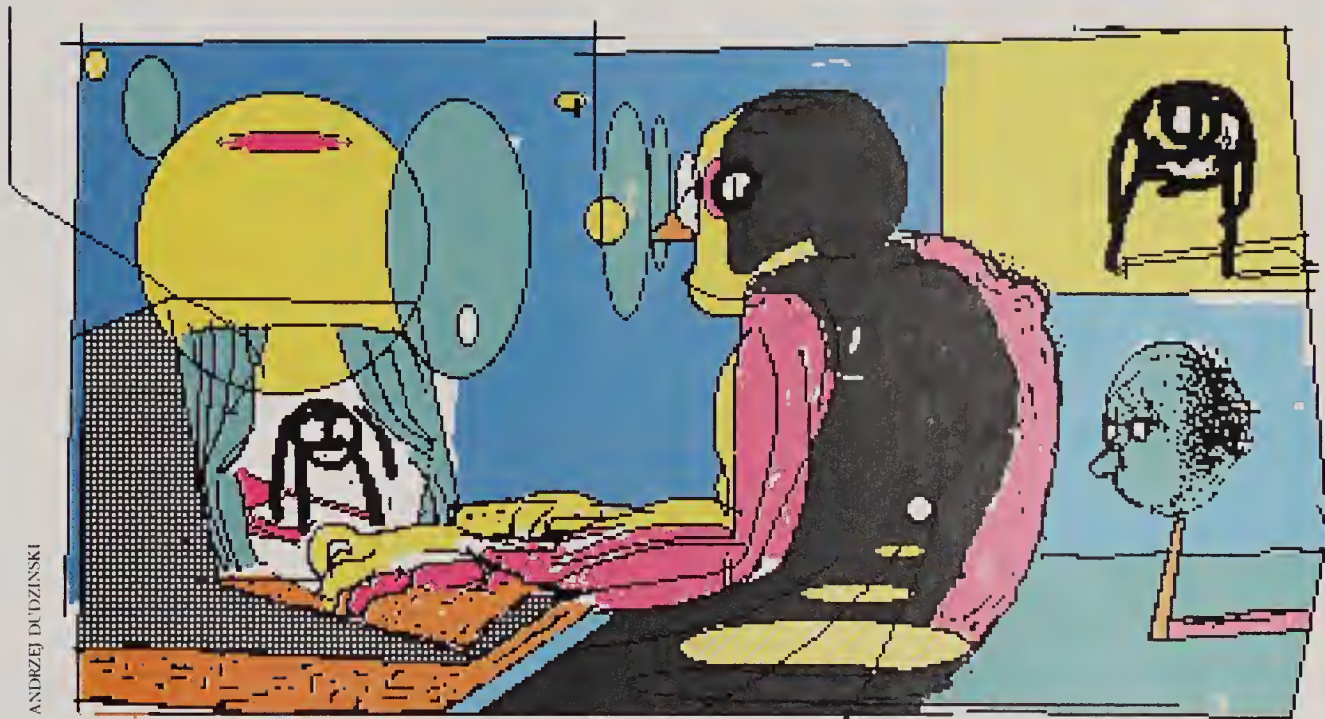
QuickShare does not limit a linked Mac and PC to being only 10 feet apart ("Machine Slaves," Reviews, August 1988). Additional cable can extend the maximum distance to 40 feet.

The chart in "Apple's PostScript Pair" (Reviews, August 1988) should have shown printer performance in seconds.

The phone number for Modern Graphics, maker of ChemStack (New Products, August 1988) is 317/253-4316.

Smart Alarms 2.9 (Bulletin, September 1988) works with MacroMaker. Upgrades can be ordered for \$10; they're free for six weeks after purchase of earlier versions.

The correct phone number for MUG Shop, a Southampton, PA, user group ("A Guide to Macintosh User Groups," September 1988) is 215/750-0792.



Engineering the Marketplace

I found David Bunnell's column on Apple's neglect of the engineering market ("Engineering a New Mac Market," August 1988) quite timely, for I had just seen an ad touting the business uses of the Mac II in several engineering magazines. How do you convince people that the Mac is a "real" computer when Apple places ads that position it as a "window to the world" of other computers? All an engineer wants is a tool that is intuitive and blisteringly fast, that controls lab instruments, and that collects and analyzes data. The Mac is well suited to this kind of work, but the problem is convincing engineers to disregard Apple's misinformation.

Thomas D. McConnell
Burlington, Vermont

Searching for a Better Sushi

In response to Jerry Borrell's Commentary ("Selling Sushi to Yokohama") in your July issue, as a Japanese Mac user, I would like to register some complaints. Apple Computer Japan has not done a good job of popularizing the Mac in Japan, mainly because of its price (my Fat Mac cost me \$3984; the price of the SE is \$5824). The

cost of software is also prohibitive; for example, Quark XPress sells for \$1104. But above all, the Mac cannot handle Japanese well. Compared to Japanese-input systems for NEC's PCs, KanjiTalk 2.0 is a second-class program. It requires more than 1 megabyte of memory and has a cumbersome and inaccurate conversion process. We Japanese consumers will buy American products if they're good, well-maintained, and reasonably priced. Please give us a better and a cheaper sushi.

Kiyoichiro Yamanaka
Rochester, Minnesota

Fan Fare

Some time ago I recall reading in Macworld News about a replacement fan kit. Also mentioned was Apple's policy of replacing the fan at no cost if the SE was suffering screen wobble. My dealer wants to charge me \$140 to replace the fan, and Apple denies ever having such a policy. Was I dreaming?

Barbara J. Dyker
via CompuServe

You may have been. The news item (April 1988) dealt only with fan noise, not screen wobble, and said nothing about a

(continues)

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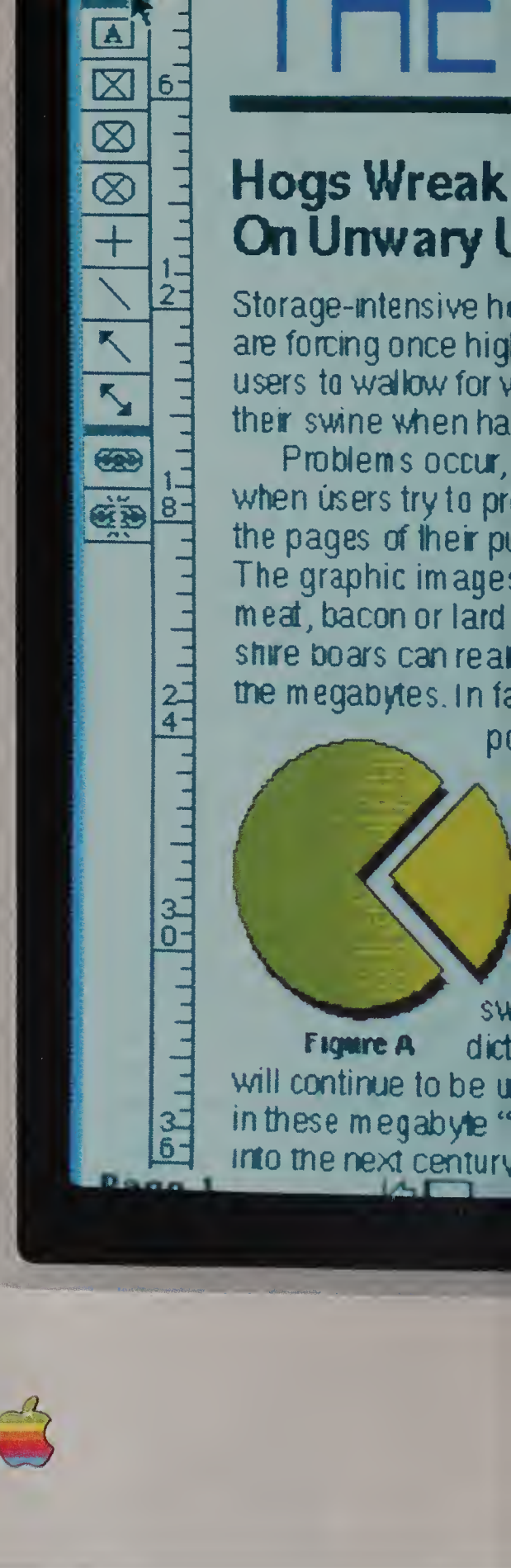
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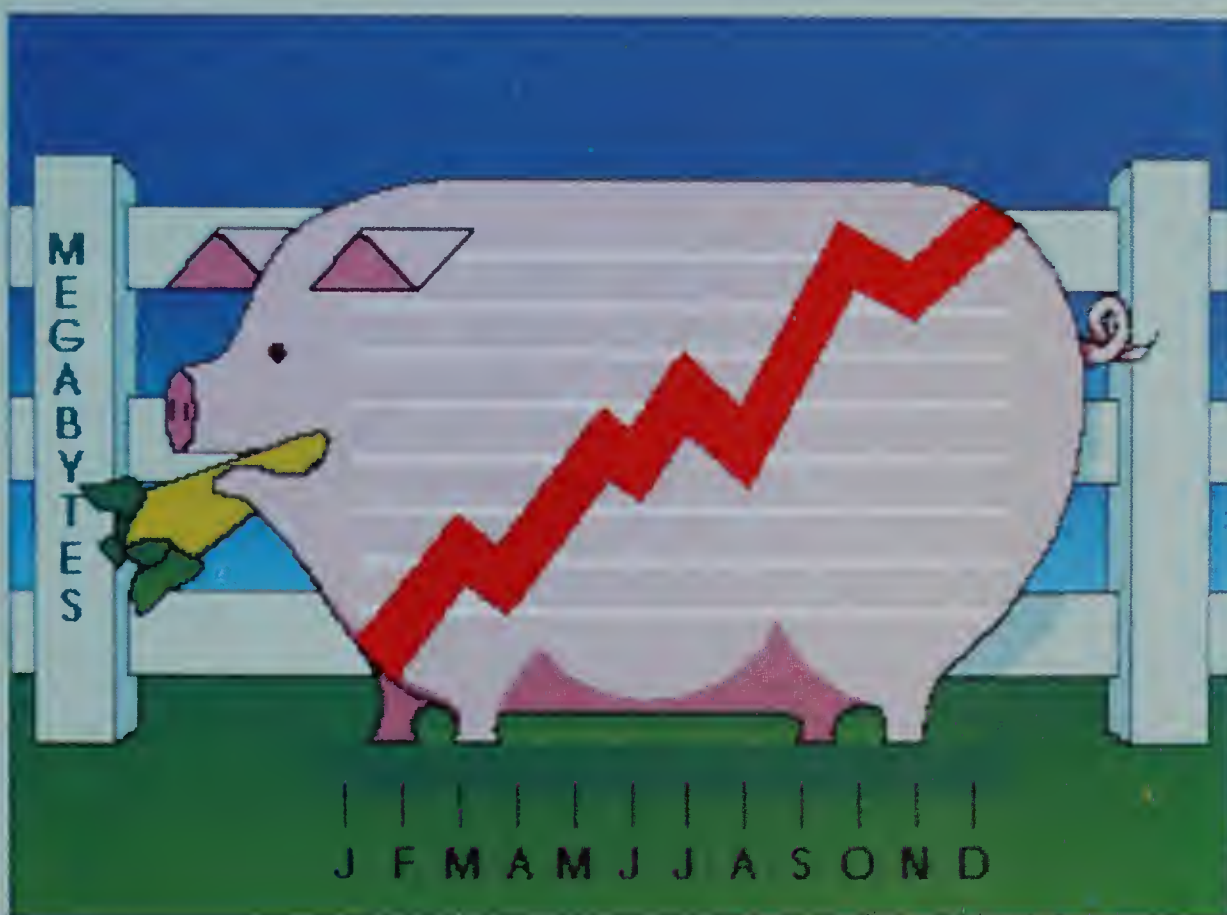
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it with you. In effect, you retain absolute control of your files. And what could be more secure than that?

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Letters

Correction

Dickens

What the Dickens Happened?

Here is the correct font sample for Howard Upchurch's Dickens, marketed by Century Software ("Fit to Print," April 1988). Also sold by Century is Thin Times Bold (mistakenly listed as shareware). Upchurch's shareware font, Louisville (\$25), can be ordered from him at 3409 O'Henry Dr., Garland, TX 75042, 214/272-7826.

free replacement policy. We did cover the SE's screen jitters in Letters (July 1988), but again, no mention of free replacement. At any rate, \$140 sounds too high; you should be able to get the job done for \$90 to \$100.—Ed.

Everything's under Control

Although I appreciated your article on MS-DOS/Mac file translation ("Business Clinic," July 1988), Danny Goodman neglected to mention three very valuable public domain programs that strip control characters from text files: Bruce Tomlin's DeskZap desk accessory, Kent Flowers' FileCleaner, and Jon Wind's Add/Strip. All three are available from major bulletin boards.

*Bill Mounce
Glendora, California*

If you don't have a modem, you might instead try contacting a user group that specializes in mail-order public domain software and shareware. For more information on such groups, see "Users Friendly" (May 1988).—Ed.

Desktop Ergonomics

Just as the discovery of cane sugar helped decay the teeth of the world, so too might the user-friendly computer negatively affect the long-term health of its users.

How does using the desktop affect your eyes, back, ears, and manual dexterity, and what kinds of products and procedures are available to alleviate the strains of sitting at the average desktop?

*Mark Powell
Albuquerque, New Mexico*

(continues)

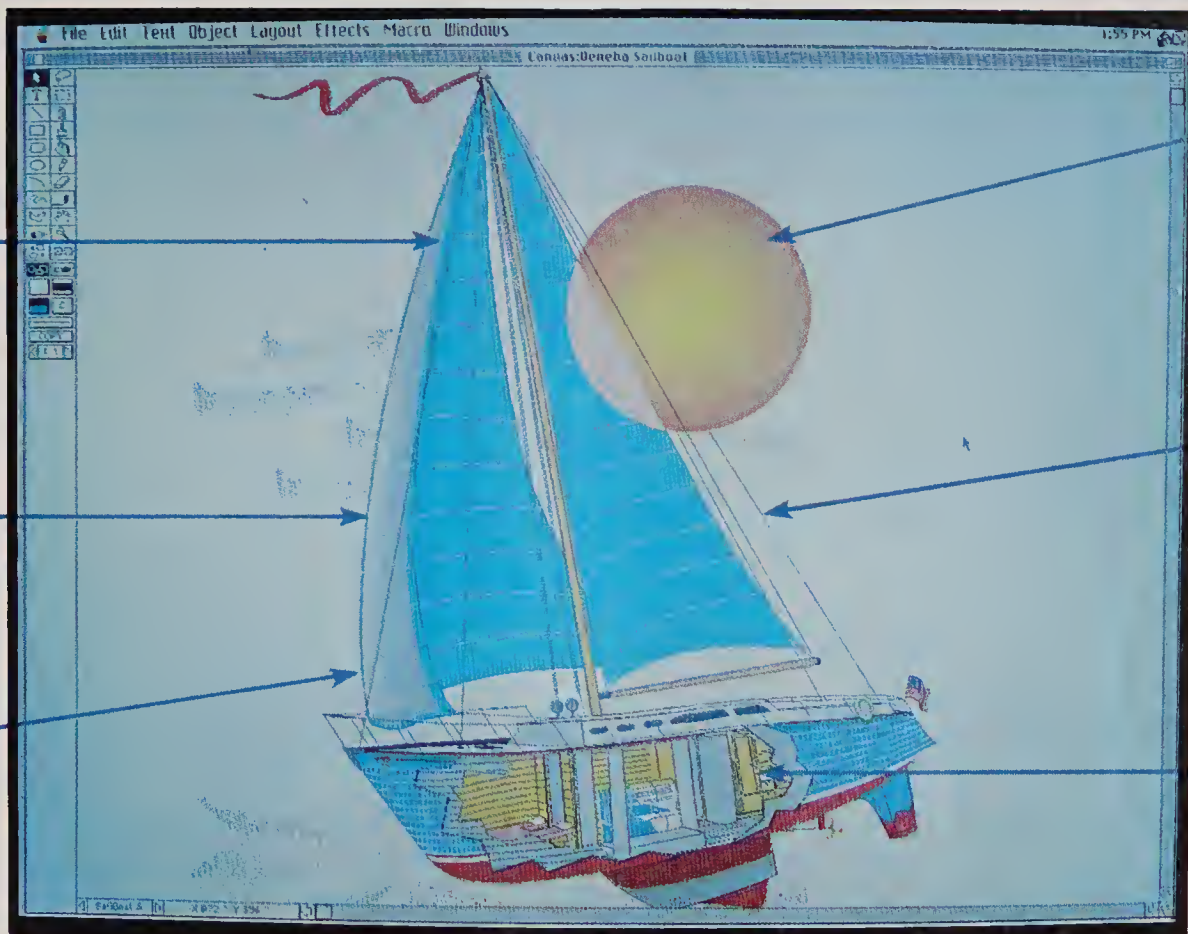
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all together to get the big picture. And when we say big...we're talking 9 feet by 9 feet.

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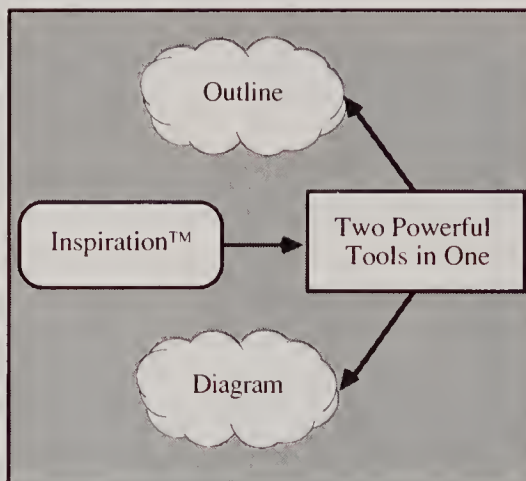
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Letters

The U.S. Occupational Safety and Health Administration (OSHA) publishes a booklet called Working Safely with Video Display Terminals. Contact your regional, district, or area OSHA office, or call the national office at 202/523-9656. Krames Communications (312 90th St., Daly City, CA 94015, 800/228-8347, 800/445-7267 in California) makes available to companies two booklets on the subject: Fitness at the Terminal (\$1.10) and Working with VDTs (\$1.10).—Ed.

Leaving Low Quality Behind

I'm struggling with an ImageWriter II that has never turned out quality printing, and I can't afford the extra \$3000 to \$5000 for a LaserWriter. Although I like my Mac, I'm now preparing to shift over to a PC-compatible—complete with hard drive, monitor, and printer—for less than I would pay for the least-expensive laser printer.

Tom Difloe

Camano Island, Washington

Before buying a whole new system, why not try booking up a non-Apple printer to your Mac? Numerous PC-compatible printers—from low-cost dot matrix to high-end lasers—can be made to work with a Mac. See the next letter for more information.—Ed.

Brand X Printers

I'm planning to purchase a third-party, 24-pin printer for my SE. I would like to see an article exploring ways of doing this (including using Orange Micro's Grappler) and determining which solution offers the most compatibility.

Greg Allen

San Jose, California

Lately we've noticed an increasing interest among readers in booking up non-Apple printers to the Mac. For a look at the problems and some solutions, see "Printer Tools" in this issue.—Ed.

Bette on the SE

The latest indication that Macintoshes are successfully infiltrating the corporate world? In the hit movie *Big Business*, you can see office staffers hard at work on networked SEs throughout the huge conglomerate co-owned by twin sisters Sadie and Rose (Bette Midler and Lily Tomlin).

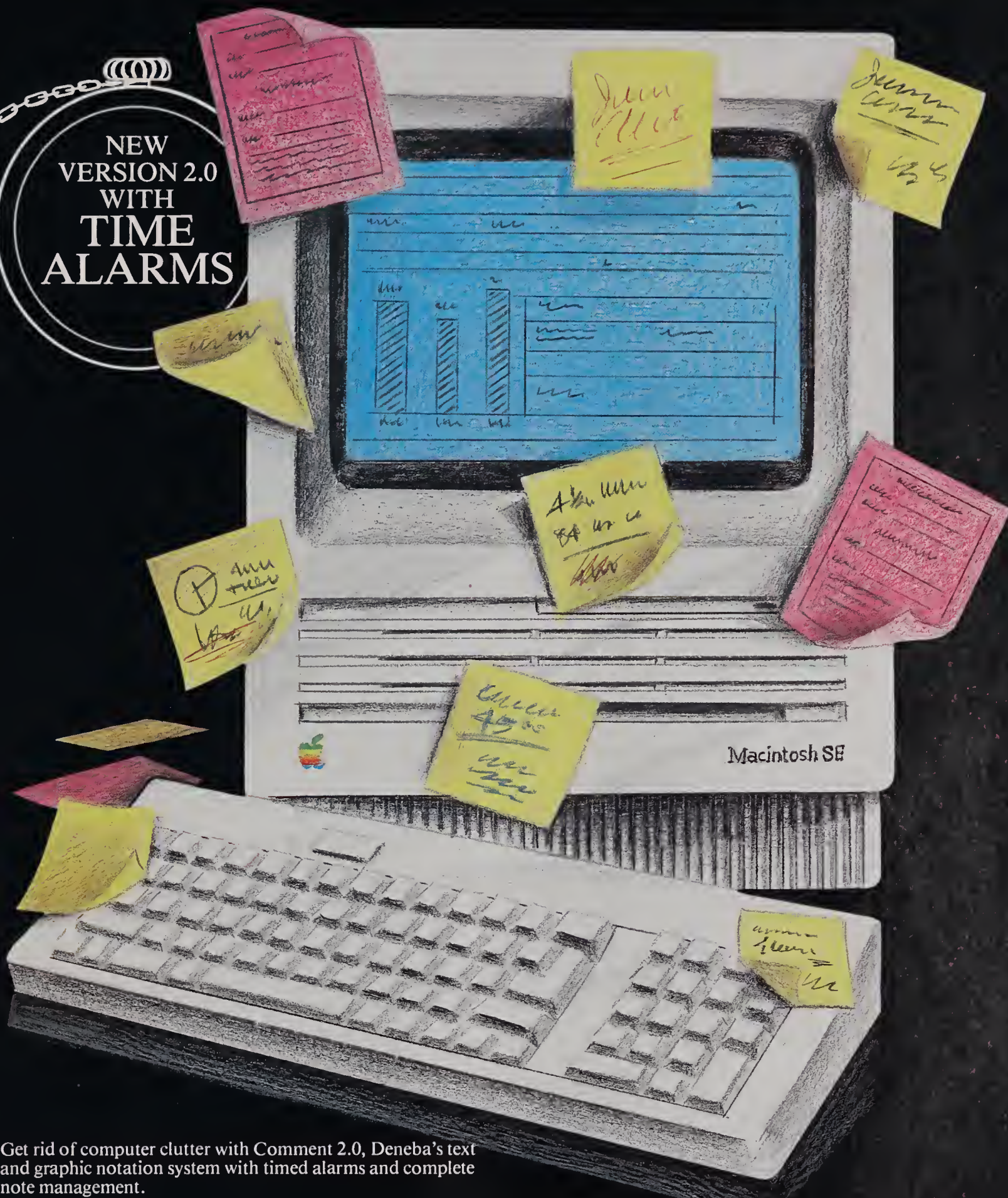
Zephir O'Meara

San Francisco, California

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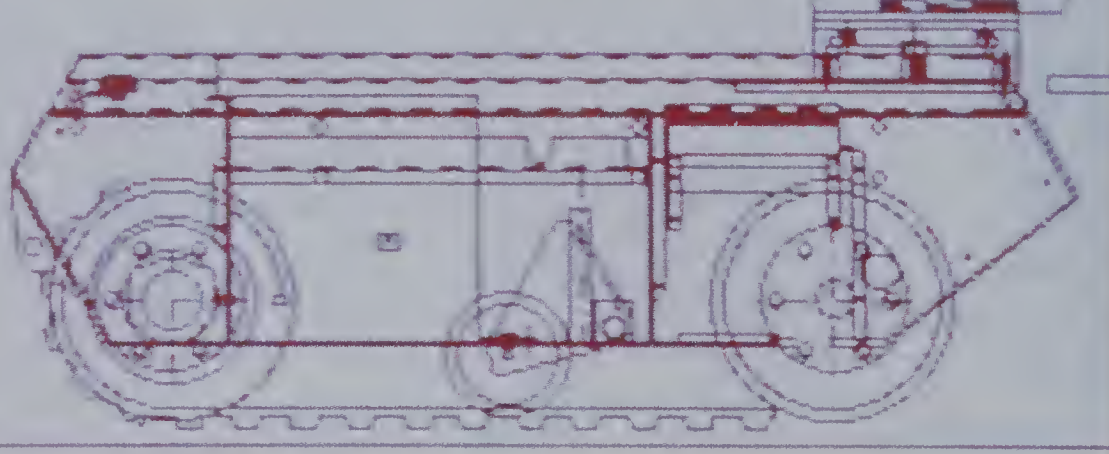


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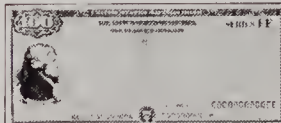
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Letters

Just a Member of the Band

Steven Levy was on target with his July 1988 column, "The Unbearable Heaviness of Being in the Computer Industry." As a musician and freelance journalist, I am keenly aware of the industry's tendency to bill technology as a means of advancing musical creativity. Although computers help a great deal, it will always be human minds and fingers that make music creative. To extend Levy's apt analogy, computers make us productive, but not just Macintoshes. Apple didn't invent MIDI, sequencers, or synthesizer editors, and it should be noted that those applications work as well (and more economically) in the MS-DOS, Amiga, and Atari environments.

Wheat Williams III
Nashville, Tennessee

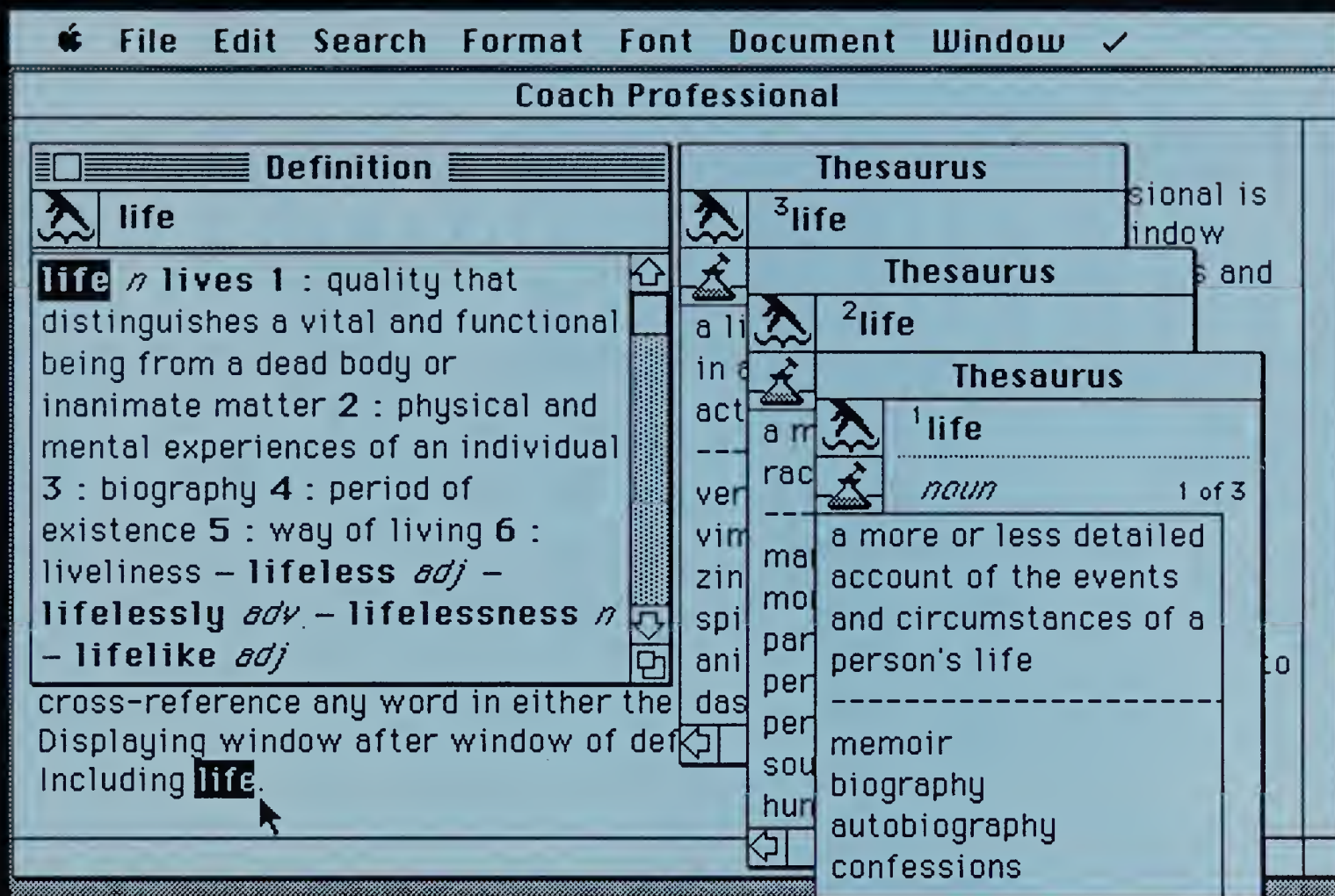
The Mouse That Crashed

About a month after purchasing a Mac II, I began to experience shutdown and start-up problems. My dealer ran diagnostic tests on the entire system and everything checked out fine, but when I brought the Mac home, the problems remained. It suddenly occurred to me that everything had been tested except the mouse. So I connected the mouse from my Apple IIGS to my Mac II, and, to my surprise, everything functioned normally. As for the offending critter, it contains a black ball instead of the usual gray one, its retaining ring is of a totally different design, and the hole diameter is smaller.

Gary D. Van Aken
Littleton, Colorado

Apple has redesigned the ADB mouse for the SE and the Mac II several times, so you'll note differences in appearance, but we've heard of no evidence of defects in any of the designs. —Ed. □

Letters should be mailed to Letters, Macworld, 501 Second St., San Francisco, CA 94107, or sent electronically to CompuServe (70370,702) or MCI Mail (addressed to Macworld). Include a return address. We regret that, due to the high volume of mail received, we're unable to respond personally to each letter. We reserve the right to edit all letters. All published letters become the property of Macworld.



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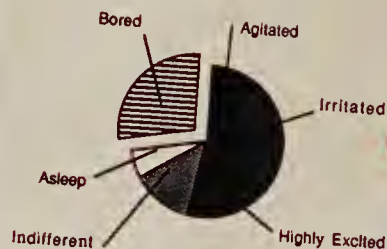
Circle 180 on reader service card

TRY FULL IMPACT AND SEE WHY EXCEL DOESN'T.

HOW SPREADSHEETS COMMUNICATE #3 in a series

A recent tracking study performed by Numerical Understanding Methods Bureau, Inc. has determined that constant and prolonged exposure to spreadsheet output may result in cases of extreme drowsiness and lethargy.

Contributing factors have been numbers with no context, lack of graphic elements, and limited abilities in the treatment of text.



SPREADSHEET USAGE

User Category	WEST	SOUTHWEST	NORTH	EAST	SOUTHEAST	TOTAL
Records	21	38	93	85	32	249
Analysis	43	47	28	38	43	197
Budgeting	38	84	39	93	45	277
Cost Acct'g	24	45	84	48	73	274
Scratch Paper	11	81	58	19	18	187
Tranquillizer	52	13	78	48	44	231
Fishwrap	24	53	73	63	92	305
To Impress Boss	14	41	83	27	38	203

ARE SPREADSHEETS EFFECTIVE?



As seen in the Usage chart above, the NUMB study has demonstrated that people in fact use spreadsheets for a wide variety of purposes. As a general rule, excitement levels tend to increase in correlation with the more non-traditional uses.

A subset of the findings of the preliminary data from the largest universe of the NUMB research has shown that spreadsheets are greatly in effectiveness (see graph at left).

so is so outside the research; however, a study by the Sorbonne University Enterprise Research Center has shown that spreadsheets are not that effective (see page 27).

Microsoft Excel
Computer Spreadsheet

Problem: Insert in internal or external disk drive
Disk format: QDDA

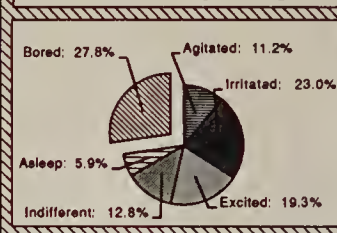
How Spreadsheets Communicate

#3
IN A
SERIES

A recent tracking study performed by Numerical Understanding Methods Bureau, Inc. has determined that constant and prolonged exposure to spreadsheet output may result in cases of extreme drowsiness and lethargy.

Contributing factors have been shown to be an emphasis on raw numbers with no context, lack of graphic elements, and *limited abilities in the treatment of text*, (and, in some instances, an over-reliance on dry language, like this).

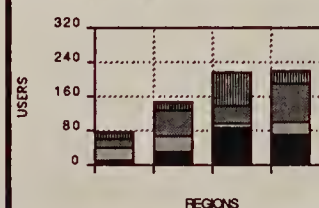
Excitement Level



SPREADSHEET USAGE

User Category	WEST	SOUTHWEST	NORTH	EAST	SOUTHEAST	TOTAL
Records	21	38	93	65	32	249
Analysis	43	47	26	38	43	197
Budgeting	36	64	39	93	45	277
Cost Accounting	24	45	84	48	73	274
Scratch Paper	11	81	58	19	18	187
Tranquillizer	52	13	76	46	44	231
Fishwrap	24	53	73	63	92	305
To Impress Boss	14	41	83	27	38	203

ARE SPREADSHEETS EFFECTIVE?



As seen in the Usage chart above, the NUMB study has demonstrated that people in fact use spreadsheets for a wide variety of purposes. As a general rule, excitement levels tend to increase in correlation with the more non-traditional uses. A subset of the findings of the preliminary data from the largest universe of the NUMB research has shown that spreadsheets vary greatly in effectiveness (see graph at left). Why this may be is outside the purview of this fictitious research; however, a track study conducted by the Sorbonne University Enterprise Research Center has shown that spreadsheets are not that effective (see page 27).

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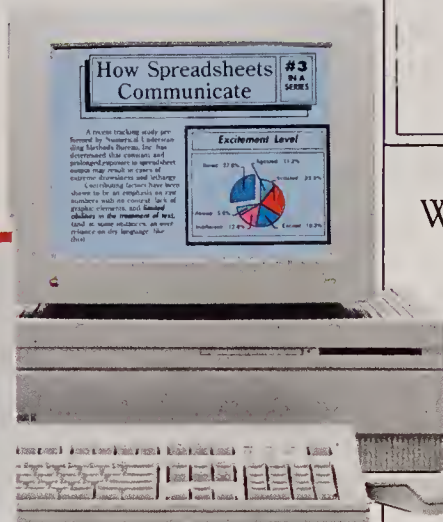
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And, you can even exchange files with many other popular programs, including Excel and Microsoft

SEE WHAT YOU MEAN

	Full Impact	Excel 1.5
Virtual Memory (allowing use of all cells)	Yes	No
Mini Text Editor	Yes	No
Customizable Icons	Yes	No
Hierarchical Menus	Yes	No
Mix fonts, sizes, styles, cell by cell	Yes	No
Optional Automatic Saving	Yes	No
Access RAM beyond 1Mb	Yes	No
Print charts and spread- sheets on one page	Yes	No
Line, Rectangle, Oval Drawing Environment	Yes	No
"C"-like procedural macro language	Yes	No

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70MB	\$899	3 1/2" SCSI Hard Disk 2 3/4" x 6 1/2" x 9 1/4"	25 ms	4 1/2 lb
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MacWorld, August 1988

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Circle 145 on reader service card



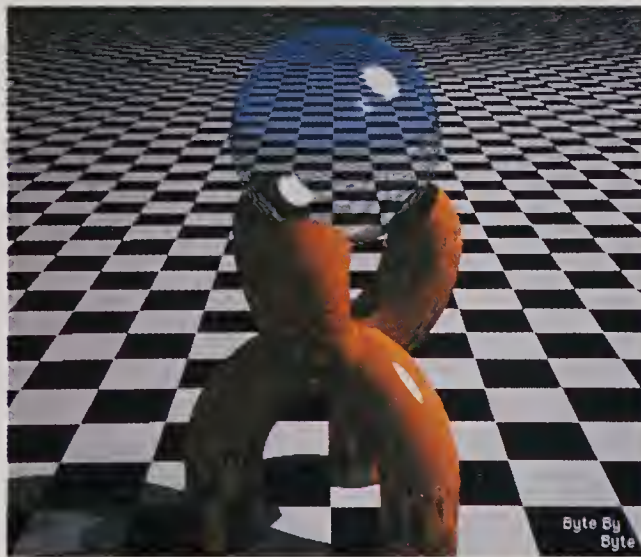
The Money of Color

Big league color and graphics are coming—at a price

Sometimes I have the feeling the Mac has lost its specialness, gone flat. Lost that magnetic draw for crowds of publicity specialists, resellers, and management information specialists. But then, just as I start to cast about and lust after newer computers, Mac graphics bring me back.

The old graphics hands at Apple, Bill Atkinson (MacPaint), Mark Cutter (MacDraw), Mike Potel (now in charge of system software), and Jim Batson (heads up video and fonts), are doing other things, but there is a group that is currently setting the groundwork for incredible enhancements to the Mac. Bruce Leak heads up the team on 24/32-bit color that was announced last summer. Dave Fung, who did color ROM work for the SE/Mac II, has directed the next-generation video card work (which will add broadcast-quality output). Mark Vickers is working a generation out, looking at hardware acceleration for the Mac. And Galyn Susman, who worked on the color picker, has become Apple's in-house divining rod for advanced graphics applications.

Their work will lead to a set of 1989 announcements that will put the Mac far ahead of any other personal computer. Even the Amiga, secretly admired by many of us, will no longer be in the same graphics league with the Mac. QuickerDraw, the high-performance extension to color QuickDraw initiated by Andy Hertzfeld and purchased by Apple for the current system software, is an indication of the future. The problem with bitmapped, window-oriented systems is that they have a hard time taking care of all the overhead for screen and system management while trying to update graphics. Apollo Computer and Sun Microsystems, both with 68020-based workstations, have discovered this phe-



The ray-cast image (top) was created by Rick Unland using Sculpt-Animate 4D from Byte by Byte Corporation. The lower image comes from Apple's animated film Pencil Test, produced by Galyn Susman.

nomenon over the past several years, and most of their systems do not have very spectacular graphics.

Apple's new offerings will definitely make color on the Mac more attractive, but it will be the third-party developers that make a difference with what Apple provides. The Expo in August was swamped with communications, utilities, stackware, storage and memory, business applications,

and accessories. But it was color that stole the show. Color everywhere, more color products than IBM PC users can have dreams about. Input, output, screens, video, animation. Gawd, even Microsoft has put color into spreadsheets—we're talking some fun. Unfortunately we're also talking some big bucks.

Cost is the bad news, but the good news is all the products that are being announced (and some are even shipping). Now we have five color paint and graphics packages to choose from: LaserPaint Color II (LaserWare), PixelPaint Professional (SuperMac), Photon Paint (Mediagenic), GraphistPaint II (Aba Software), and Studio 8 (Electronic Arts). Even the color drawing packages are increasing. MacDraw II now has competition from Canvas 2.0 (Deneba), Draw It Again, Sam (Aba Software), and Drawing Table (Brøderbund).

While Apple makes the transition to real color (24 to 32 bits) on its video cards, third-party developers are wasting no time. In fact, despite some notable missteps (RasterOps had previously taken another approach to 24-bit color, but has already re-engineered according to Apple specifications) the third parties are leading Apple in full color—TrueVision, RasterOps, Computer Friends, and SuperMac are all talking about their 32- and 24-bit cards.

This number of bits is important if the Mac is to be able to display images that rival 35mm slide quality, and it's getting there. If and when RAM prices ever decline, we'll hopefully have 24-bit color cards under \$1500, and monitor/card combinations under \$3500. The biggest problem with color, of course, is the cost of the memory for all of the data storage and the

(continues)

KANSAS CITY

More
fountains
than Rome
and more
boulevards
than Paris:
Kansas City
will surprise
you with its
diversity,
hustle, and
charm

LET'S SEE, KANSAS CITY. NEW ORLEANS MEANS JAZZ AND NEW YORK GLITZY SHOPS, SEATTLE MEANS RAIN AND MIAMI SUN. Other cities are known for their dining, their arts, their historic interest. It may surprise you to learn that Kansas City is all these things and then some. With more fountains than Rome and more boulevards than Paris, this city is one of America's underrated travel destinations. From the symphony to the Chiefs game, from gleaming shopping plazas to restored frontier stores, from art galleries to jazz nightspots—Kansas City is a smorgasbord of diversions. The city has clearly earned its nickname, "The Heart of America."

ARCHITECTURE A visitor to Kansas City can't help but be struck by the contrast between old and new, with the building boom of the last few years inserting steel skyscrapers next to century-old storefronts. But building booms are nothing new here, and the city sports an unusual array of fine 19th- and early-20th-century buildings. A casual walk through town reveals the architectural evidence of 130 years of vigorous growth. The highlight, especially for history buffs, is Westport, a lovingly restored trading village that was a major outfitting center for westbound travelers in the 1850s. Also of special interest is Country Club Plaza. Built in the 1920s and famous as the nation's first shopping center, it's a startling sight in the middle of a large Midwestern city: a collection of sumptuous buildings modeled after those in Seville, Spain, interspersed with modern buildings.



The area's best example of late-19th-century Victorian architecture is some 10 miles from downtown, but worth the trip. It's in Independence, and it's the former home of President Harry S. Truman. Now under the stewardship of the National Park Service, the house is open to the public. And while you're in Independence, stop in the Truman Library for a look at the huge mural by Thomas Hart Benton in the lobby, entitled "Independence and the Opening of the West."



SHOPPING The star of Kansas City shopping is the Crown Center, an 85-acre "city within a city" built by Hallmark Cards. Crown Center offers 90 shops, department stores, and restaurants of every



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Financial Report To Division Managers

The first quarter numbers are in . . .

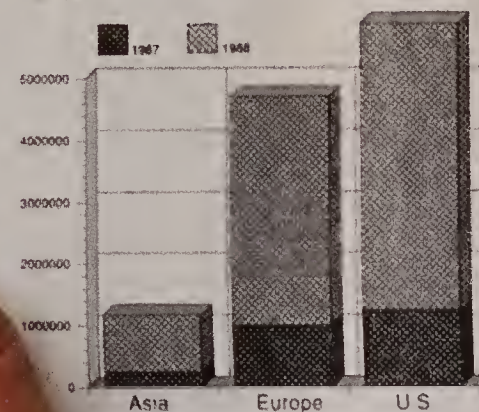
	Three Months Ending		Six Months Ending	
	MARCH 31, 1988	MARCH 31, 1987	MARCH 31, 1988	MARCH 31, 1987
SALES				
U.S.	4,657,770	1,223,138	8,766,900	2,185,070
Europe	3,726,216	978,510	7,013,520	1,748,056
Asia	931,553	244,627	1,753,380	437,014
Net Sales	9,315,539	2,446,275	17,533,800	4,370,140
OPERATING EXPENSES				
Cost of sales	2,081,761	201,003	3,823,581	363,980
Selling, general, and administrative	3,644,439	971,806	6,959,683	1,690,362
Research and development	465,495	148,153	896,671	262,891
Income from operations	3,123,844	1,125,313	5,853,865	2,052,907
Equity in loss of K.C. operations	(158,915)		(218,134)	
Interest income	73,473	53,578	108,171	62,413
Income before federal income taxes	3,038,402	1,178,891	5,743,902	2,115,320
Provision for federal income taxes	1,135,000	511,000	2,175,000	911,000
Net income	1,903,402	667,891	3,568,902	1,204,320
Net income per share of common stock	\$0.17	\$0.06	\$0.31	\$0.11

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ImageWriter Ribbons	\$2.50 ea.
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4-color	
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SJK

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high cost of the monitor. So if system cost (including hard drive, please) could come down to \$3500, then a Mac II-like color system would sell for about \$5500. And every time I shake my head and say that's too much, I remember that I paid about \$5500 for my first IBM PC—kinda puts things into perspective, doesn't it? And that was in 1984 dollars.

Why, you ask, should a 19-inch color monitor cost so much? After all, it's basically a 19-inch color TV, isn't it? The reasons for the high cost are twofold. First, although some monitors are produced on the same assembly lines as consumer TVs (in Asia, naturally), they do have different or higher-performance electronics that merit a higher cost. Second, resellers in the United States pay more to their suppliers than they would if they were only selling televisions. And as those of us who used to hook up our color television to an Atari 400 or 800 know, there is a big difference in quality. Okay, the resellers are also making some money on the proposition, but competition should lower prices over the long run. And if you want a smaller monitor, then cost will certainly decline as the players from the IBM monitor market become more important in the Mac market.

If you've got the money, the biggest problem will be choosing the product—Adex, Radius, E-Machines, SuperMac, Nutmeg Systems, PCPC, Sigma Designs, and MegaGraphics all have new 8-bit, monitor/video card combinations. And there are monitors for the Apple or SuperMac card from several other companies.

And speaking of video, it's apparent that we're still pretty far from having a professional-standard video card. Despite announcements from Julian Systems, Mass Micro Systems, AST Research, TrueVision, and Apple on video products, you would be hard put to convince a television engineer to use a video card to produce broadcast-quality genlocked video signal. But we've definitely got home video quality, and if you're just looking for video scanners, Pixelogic, Computer Friends, MegaGraphics, RasterOps, Data Translation, and Truvel are shipping products today.

Video input is only part of what we want, of course—many of us use color slides, or even 3-by-4-inch transparencies. Transparency scanners are making some headway as well. Truvel produces a scanner for 3-by-4-inch transparencies at 24

(continues)

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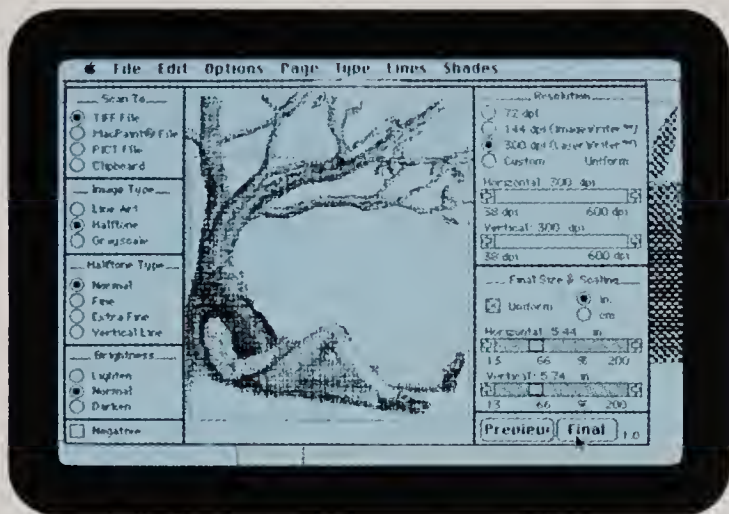


Place. Bring in your mast-head from memory, place the scanned images wherever you want, copy and place multiple images, key in text, wrap, enlarge or shrink to fit.

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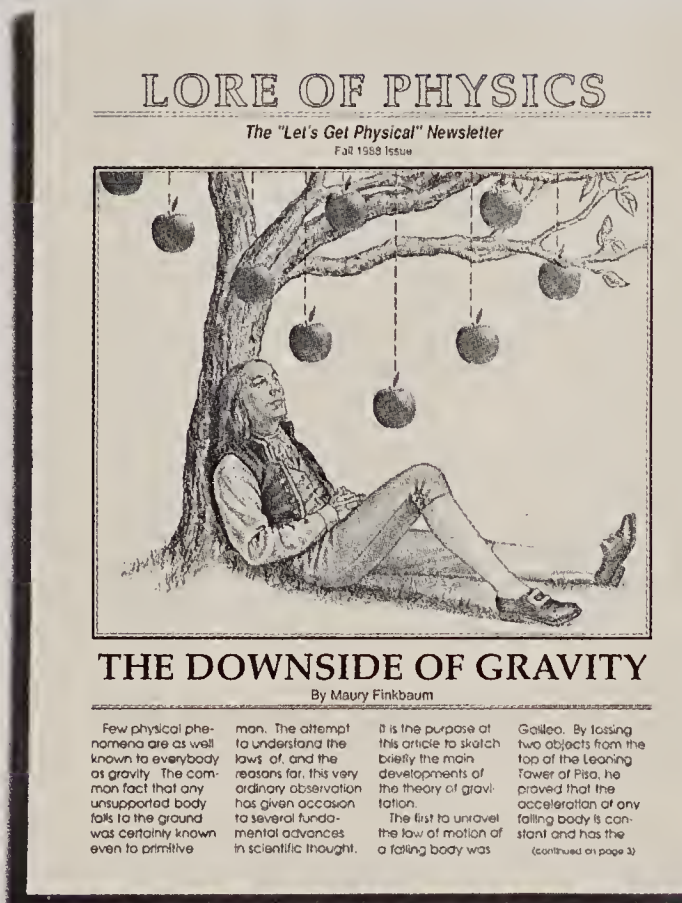
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Circle 261 on reader service card

Commentary/Jerry Borrell

bits. Eikonix and Howtek both have 35mm slide scanners that work. BarneyScan, the first company to announce a 35mm scanner, seems to be suffering from marketing ineptness.

Computer-aided design is certainly blossoming around the Mac II. Autodesk has dominated the IBM market with its AutoCAD product, but will face challenges from specialized packages in the Mac market. IDD's Dreams looks very strong, and VersaCAD is making quiet, speedy progress towards advancing its product. Generic Software, the IBM CAD spoiler now, has out its \$99 design product for the Mac, CADD Level 1. Infinite Graphics has the first constructive solid-geometry CAD package for the Mac. It's far from ready, and it's slow as a glacier, but it will improve. On the high-interest side is Claris's entry into the CAD market, Claris CAD. The package was always a good one—and is better now, having been rewritten to sit on top of MacDraw II and extend that platform into professional CAD use.

The downside for Claris is that more people will nod their heads and say those guys only know how to buy products, when in truth the company is on a well-planned path to improve the existing Apple products, acquire strategic products, and release products developed in-house. Claris is now approaching the third phase.

It's architectural CAD that's making the most dramatic strides. Not only is ModelShop (Paracomp) finally shipping, but Mac Interiors (CompServeCo), Dyna-Perspective (Dynamware), ArchiCAD (Abvent), and Mac Architrion (Gimeor) are all competing. Mac Interiors is specialized for interior design. It renders with wire frames but has fills that make surfaces look solid. Mac Architrion has exteriors and floor plans. And Dynamware has a dramatic 3-D approach to exterior design rendering.

I've talked about imaging products before, but there are some truly amazing ones coming our way—venerable Visual Information now sells a rendering package, The Presentation Toolkit, for under \$400. Byte by Byte Corporation, a company that previously developed software for the Amiga, produces the Sculpt-Animate 4D software used to create the ray-cast image in this column.

A new company from France, GTFS, has a truly powerful color-imaging package, Optimage, featuring convolutions, Fourier transforms, filters, and artificial

(continues)

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InfoWorld, March 14, 1988...

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Jobcost

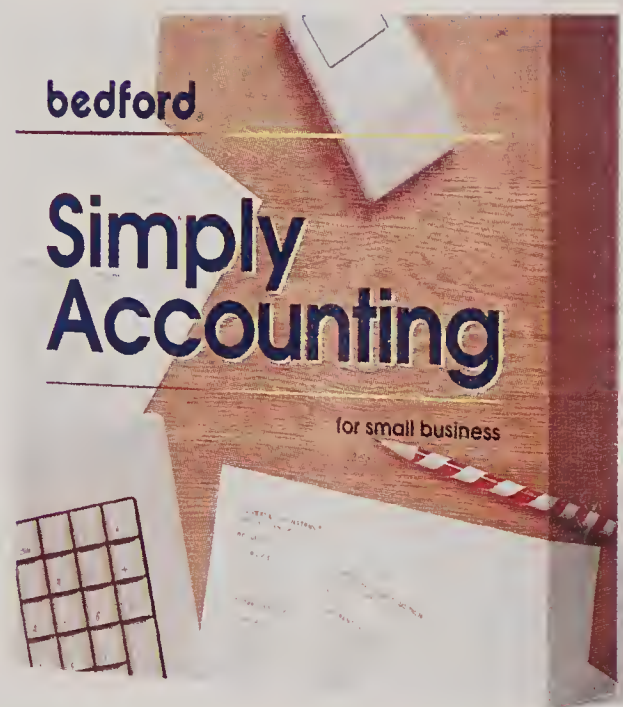
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Circle 10 on reader service card

color enhancements. It's the sort of product you would expect to see on a minicomputer. Power Software has some similarly remarkable 3-D imaging software called MIPS running under its development system. And how can we forget Pixar—it may sell mainly to medical markets, but we'll always think of the company for its animations.

While I'm on the subject of animation, MacroMind's Marc Canter seems to have pulled another good product out of the hat—3D Works. Certainly it is far ahead of its only competitor (in terms of nearness to completion and features), Aegis's Animation Workshop. Apple's animation work under Galyn Susman has produced Apple's first animated film, *Pencil Test*, shown first at the Association for Computing Machinery's SIGGRAPH 88. The film is a captivating portrayal of an endearing little 2-D pencil that takes a walk in a 3-D world.

There are several new additions to the color world of DTP, including Mainstay's MarkUp, a program that allows files to be annotated much in the way manuscripts are corrected or edited at publishing companies. There is color clip art now; Image

Club Graphics has a CD ROM with 100 megabytes of PostScript-format art, and Enabling Technologies has the first disks of 3-D color clip art. (You remember Enabling—the company that made Pro3D.)

Professional publishing work with color has accelerated; Pre-Press Technologies, Avalon Development Group, and Crosfield-Lightspeed are pushing for products on the Mac that will fit into magazine publishing environments. Avalon's Photo-Mac is offering color touch-up, while Crosfield and Pre-Press are attempting to serve professional publishing environments with systems that manipulate color for separations.

Color output, sadly, is still in a primitive state. QMS reigns in this arena with its \$25,000 thermal PostScript printer. Howtek and Sharp have prototypes of low-cost thermal printers for the Mac. Eikonix has a very interesting 3-by-4-inch thermal printer, which produces a high-quality picture of a Mac screen. Lasergraphics and Presentation Technologies have film recorders that can capture PostScript files as slides.

Deep in my heart there is a yen for games. Crystal Quest, MacGolf, and a few others have color, true. But I want video-

disk-based scene simulation, or at least fast rendering of enough polygons to make a flight simulator seem real. Shading, textures, and shadows—awright, shadows are too much, but at least fast, flat shading so that 3-D shapes seem real. What we need is something like Billiard Parlor, one of the first color games for the Mac II. (It promptly bombed after System 5.0 but it was good while it lasted.) The pool table had the look of felt, the balls had little specular reflections, the cue stick gave a sense of action. It made us want more.

As the transition to color continues, a few things are missing—like a cheaper Mac II. You know—one with, say, three slots and costing about half as much as the current one. And fewer system memory limitations. I wouldn't be surprised to see both of these someday. Jean-Louis Gassée, we hear you, we're saving our money.

But most of all we're awaiting further versions of the products that I've just mentioned. The ones that mesmerize us. The best-kept secret of all is that when the kinds of images that you see here can be produced by each of us, Apple will be selling more Macs than even it suspects. □



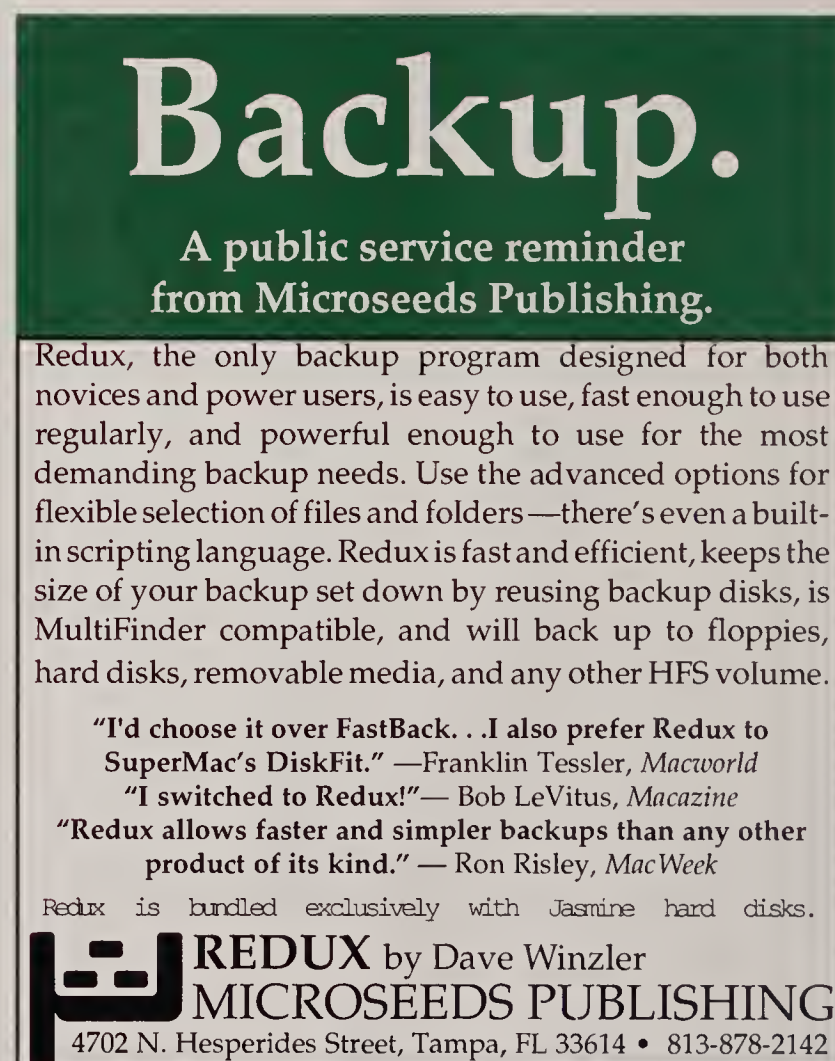
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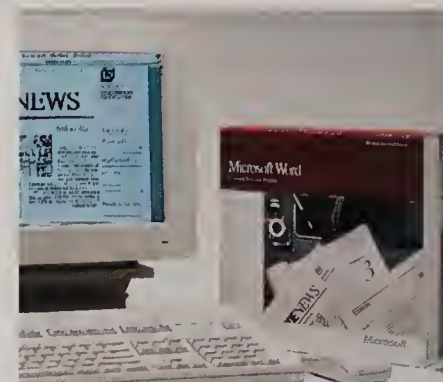
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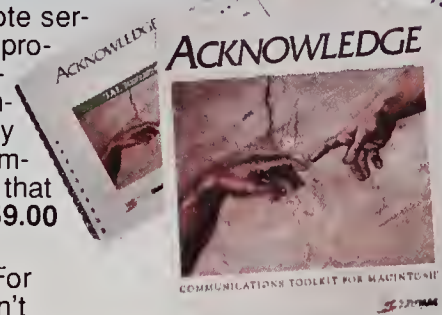
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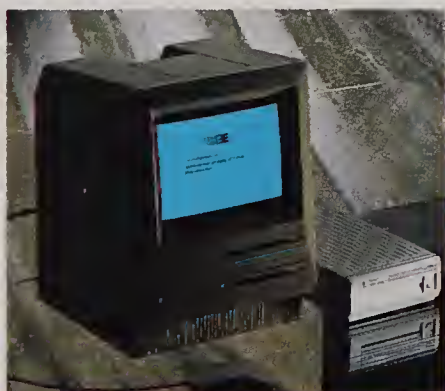


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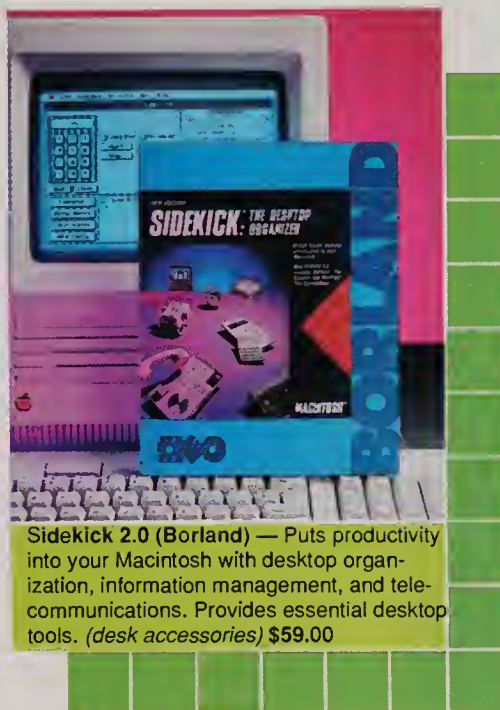
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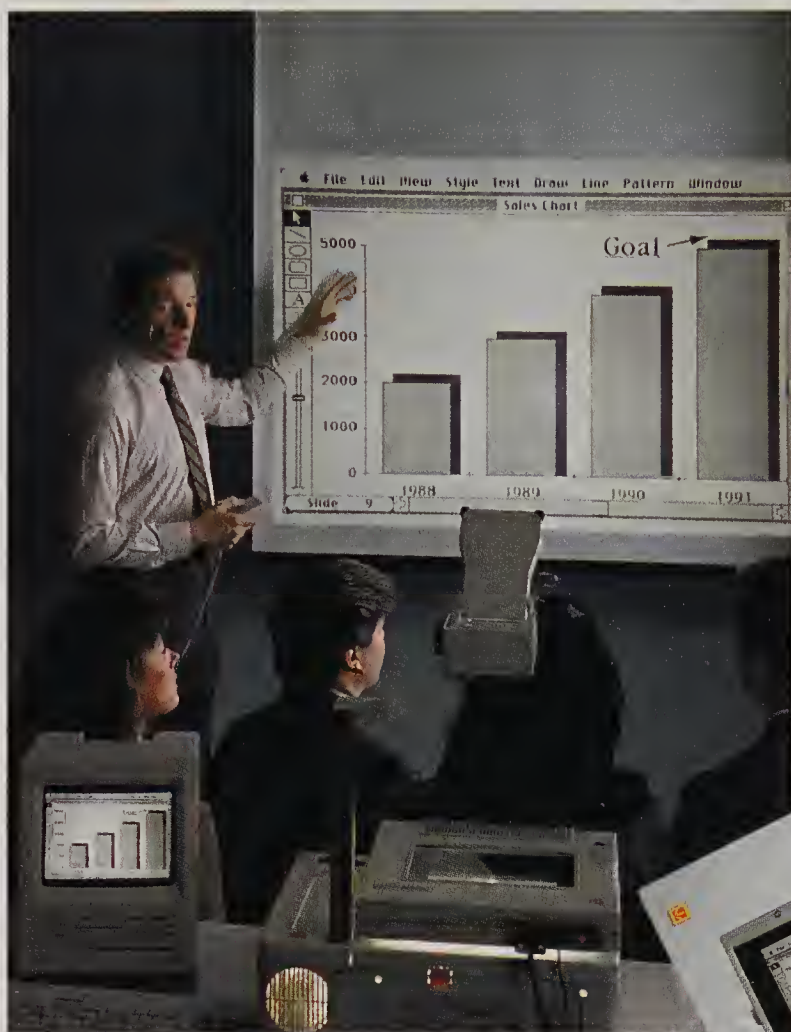


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Viruses R Us

*Doctor, doctor, give me the news—
are my files unhealthy? And will we survive
the virus panic of '88?*

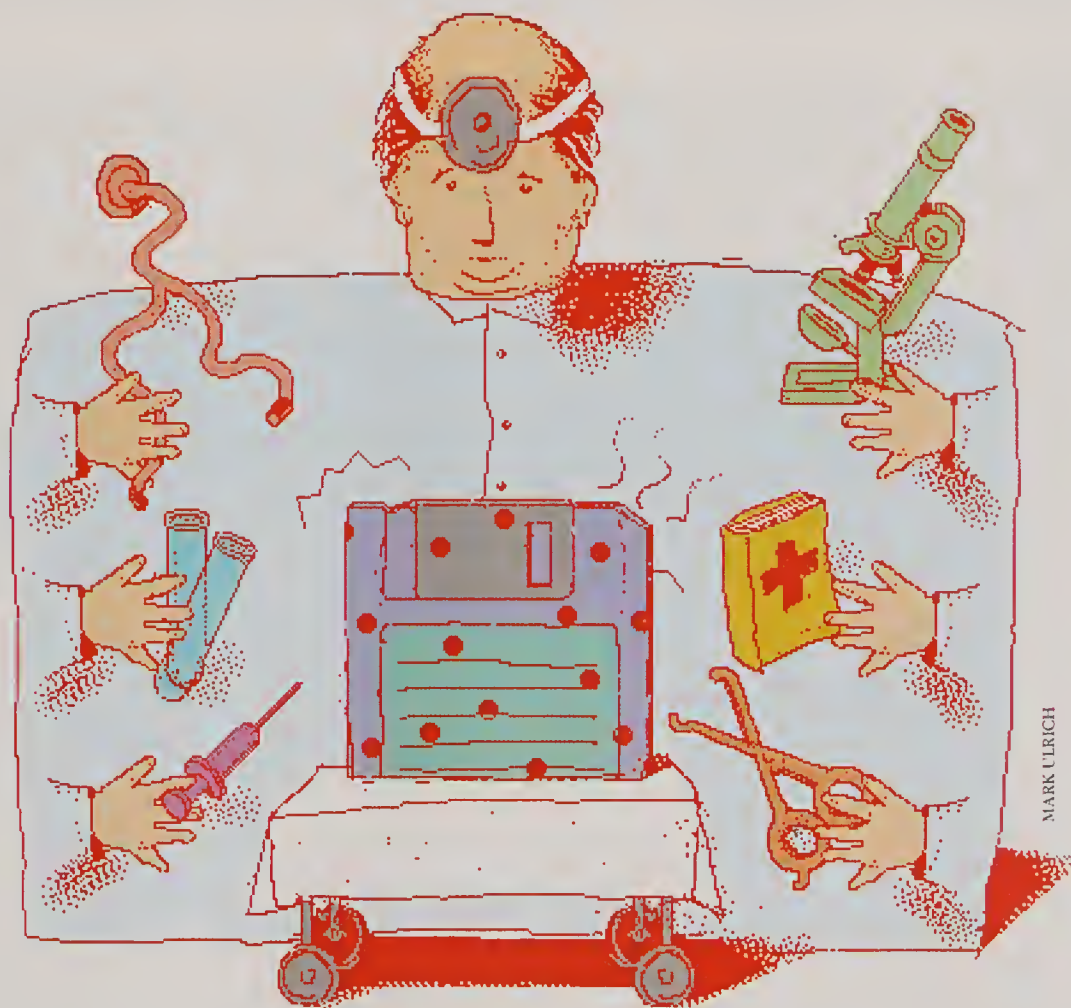
There are times when everything hums nicely in your life. Triple positive on the biorhythm chart. A jingle of coins in the pocket, a comfortable chair, an engaging book, a loving companion. Good water pressure in the shower. Iced tea in the summer, cappuccino in late fall. And then, like an unforecasted gale-force gust when you're halfway across the high wire, a discordant note strikes, and you realize that it has been all illusion, a cheap card trick—we are human, we are doomed, alone in our miserable cells.

In this case, it was a message on my answering machine that provided the grim epiphany. The voice of an editor who had just received a floppy disk from me. "Steven," he said, "I hate to tell you this, but you've got a bad virus. You'd better check your system."

My immediate reaction was rather sanguine. I'd been following the brouhaha about computer viruses (see "Mad Macs" in this issue for more on the subject) with some degree of amusement. Though I abstractly recognized the concerns of corporations and individuals threatened with data loss or involuntary exposure to peace messages resulting from computer viruses, I had never really considered what it would mean if, say, *I* had one. Not only had I neglected to panic at the incipient threat of infection, but I'd gone about my electronic business as always, including downloading software from such sources as Compu-Serve, MacNet, or some guy I met at my user group meeting.

Was I now to pay the price for my carelessness?

Steven Levy is a Macworld columnist and the author of The Unicorn's Secret: Murder in the Age of Aquarius (Prentice-Hall Press, 1988).



Breaking the News Gently

Since I had no time that day to spend with my Mac and its hard disk, I was able only to switch the machine on and see the normal desktop. It was not until a few hours after I heard the message that I realized its impact might be more profound than I had imagined. Naturally, I spilled my concerns to my loving companion, whom I had only recently engaged in holy matrimony.

"Does this mean you've lost any files?" asked my bride.

"Not necessarily. In fact, I think that's rare with the known Mac viruses," I replied.

"Are you sure?"

"No," I said glumly.

She laughed.

I took a deep breath before my next

remark. "And by the way," I said, "if I have the virus, uh—you've probably got it too."

She was no longer laughing.

"You see, since I bring disks from my computer home from the office and use them in your computer, then—"

"You mean you've given the virus to me?"

The conversation had taken an unpleasant turn. She wanted to know if I'd been aware of the virus threat and, of course, being a diligent computer columnist, I had. Then why hadn't I done everything possible to avoid it? *Because I didn't think it would happen to me.* In other words, my spouse surmised, in an accusa-

(continues)

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
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tory tone, that there I was, tomcatting around the computer nets, downloading any old file, blithely ignoring the fact that I was potentially compromising not only my own data, but that of my family unit as well.

I had to admit this episode was making me look pretty bad.

My companion, whose demeanor could no longer be remotely described as loving, gave me an ultimatum: fix these viruses—or else.

The Examination

First, I had to determine whether or not I had the virus. Maybe it was all a misunderstanding. I knew that the most common Macintosh virus was something called Scores, particularly virulent among computers owned by the federal government and a certain computer magazine to which I contribute. One simple, yet not conclusive, test for the disease was to open the System Folder and see if the Scrapbook file looked like a Macintosh icon or a plain document icon. The former was the “healthy” symbol, and—thank God—that’s what I had. But to be sure, I had to take the next step. So I called up a network and downloaded a couple of the antivirus programs that can determine the extent of an infection.

Ironically, one can easily contract a virus by seeking out software that ostensibly fights viruses. In fact, in the MS-DOS world, the creator of a program called FluShot (designed to prevent infection by certain viruses) had been systematically improving the program and renumbering the releases—FluShot 2, FluShot 3, and so on—when he discovered that a total stranger had put up a program on the BBSs that pretended to be the next release, FluShot 4. Sure enough, the so-called FluShot 4 implanted a nasty virus in the user’s computer.

But in this case, I trusted the powers at CompuServe to police these particular programs. Besides, I was impatient—I had to know the prognosis. I got two virus-fighters: Virus Rx and Ferret. The first was a diagnostic program, produced by Apple, specifically designed to see if the dire Scores virus was present on the disk. I put the program through its paces. The hard disk rattled and rolled, apparently giving its scrutiny to any “invisible” files or INIT files that loaded themselves into the operating system without an invitation. Since my sys-

(continues)

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tem had seen a virtual revolving door of desk accessories, start-up screens, and other oddities, Virus Rx was pretty busy. But its final conclusion was that no Scores virus existed.

Still, I sought a second opinion from Ferret, another Freeware program. (Software artists have taken pity on users during this plague, and many have donated their virus-fighting efforts to the public domain.) After a tense period of disk access, Ferret confirmed my hopes—no virus. It did tell me that both the System and Multi-Finder files on my Mac were “damaged and should be replaced,” and I vowed to do just that at an early date. But the disease I’d been accused of spreading did not seem to be in evidence. It could, of course, be a rare virus undetectable by those programs. But aside from bomb screens caused by prerelease software, I had not been experiencing any problems. If this be illness, so far it was benign. On the other hand, I could not be sure that on a certain date a column in progress would not be replaced with a graphic depicting a cold mountain stream from which Canadian beers originate.

About That Virus...

It was around that time that I heard from the editor who had given me the bad news. “You might not have a virus after all,” he admitted. (Now he tells me.) Apparently he had been using one of those vaccine programs that identify any alien data microbes instantly upon appearance, and the disk I had sent him set off bacteria alarms—it was then that he called me. But further examination of my disk failed to locate any viruses. So I was clean!

Or was I? Again, the vexing thing about viruses is that even if you test perfectly, there is no way—*no* way—of knowing if you carry a new, as-yet-unidentified form of virus that will destroy any or all of your data. Such is the uncertainty, doubt, and fear that the virus scare has engendered. To people like me, who have long supported hacker wizardry, insisting that “real” hackers almost never commit intentionally destructive deeds, this is a particularly depressing development. Though I still believe that the creators of viruses are few in number, the effects of their handiwork are truly causing panic and recrimination in software circles—and for good reason.

(continues)



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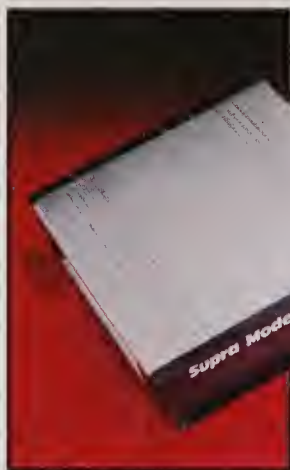
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Programs & Peripherals



Specials good through
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Supra Modem 2400 149.

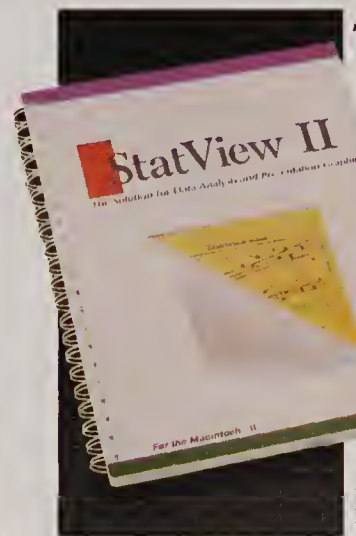
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Deneba Software Comment 2.0	54.	Solutions, International Super Glue	52.
Electronic Arts Disk Tools Plus	31.	SmartScrap & The Clipper 2.0	52.
Exodus Software Retriever	59.	Symmetry HyperDA (Req. 512K)	38.

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StatView II 369.

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MAC-101 Keyboard (Specify ADB or non-ADB) 139.

Utility Software

ALSoft Disk Express	35.	Read-It! TS (For Thunderscan)	79.
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Emerald City Software LaserTalk	187.	SuperLaserSpool 2.0	82.
Fifth Generation Systems		Diskfit 1.4	54.
FastBack For The Macintosh	54.	Sentinel 2.0	155.
Suitcase or Power Station	37.	Symantec MacSQZ!	49.
Ideaform Disk Quick V2.10	27.	Symantec Utilities for Mac (S.U.M.)	59.
Infosphere Liaison	129.	Williams & Macias Disk Finder	29.
Microlytics, Inc. GOfier	45.	myDiskLabeler w/Color	31.
Microseeds Redux	65.	myDiskLabeler w/LaserWriter Option	34.
Olduvai Software		Working Software, Inc.	
Icon-It! or MultiClip	39.	Findswell 2.0 (Document Finder)	36.

Communications Software

Compuserve		Hayes Smartcom II 3.0	88.
Compuserve Starter Kit	24.	Peripherals Computers & Supplies	
Grolier On Line Encyclopedia	32.	VersaTerm	69.
Compuserve Navigator	45.	VersaTerm-Pro	199.
DataViz MacLink Plus with Cable	145.	Software Ventures	
Dow Jones Desktop Express	95.	Microphone II (Includes Glue)	225.
Freesoft Red Ryder V10.3	55.	Traveling Software LAP-LINK	85.

to Polish Up Your Mac...

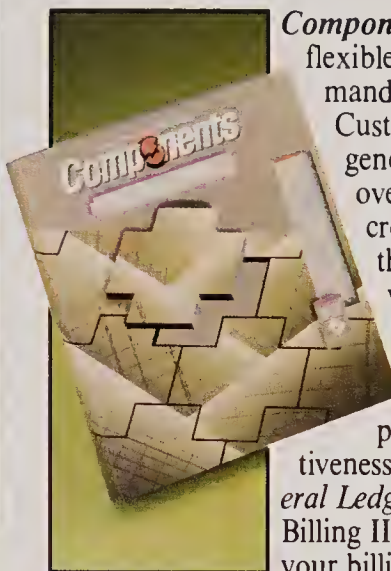
Wedge XL30+ & XL45+ by Cutting Edge

These two compact, easy to install hard disk drives are ideal for the individual or small business. Each drive is shipped preformatted and with Apple's System software, including MultiFinder and Backgrounder laser printer spooling software. Just unpack it, plug it in, and you're ready to compute! The **Wedge XL30+** and **XL45+** feature automatic head park and lock on powerdown, easy daisy chaining, external address switches, rapid (23 ms) access times, and a one-year manufacturer's warranty. Quiet fans, small size, and a 6-foot SCSI cable let you take your data anywhere. Both drives are packed with manufacturer-tested backup software that makes data protection a breeze!



Wedge XL30+ 629.
Wedge XL45+ 829.

Components General Ledger by Satori



Components General Ledger is comprehensive, flexible accounting software for users who demand power and ease of use in one package. Custom fit, easily defined data input and report generation support gives you complete control over what goes in and what prints out. You create the account numbering system, and the special entry and regular journals - which can be manual offset or automatic offset types. It's easy to take advantage of **Components General Ledger** full drawing toolbox, PostScript support, and print preview function to improve the effectiveness of printed materials! **Components General Ledger** interfaces directly with Satori's Legal Billing II and Project Billing software to support your billing department easily and effectively!

Components General Ledger 385.

Cutting Edge 800K Drive by Cutting Edge, Inc.

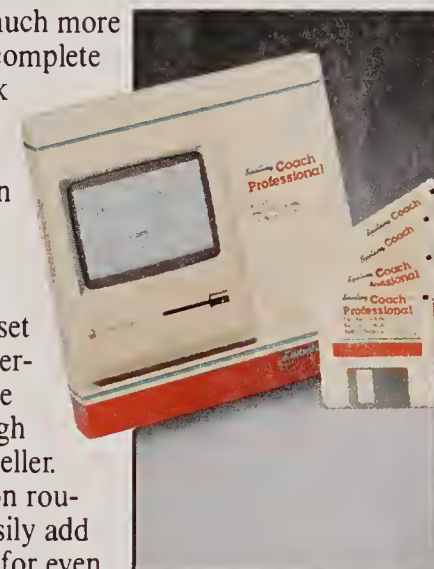


The **Cutting Edge 800K Drive** features an LED in-use light, a manual eject mechanism, and a compact platinum case. It's compatible with the old and new ROMs so you can use it on a standard Mac 512K, a MacPlus, or a Mac SE. The **Cutting Edge 800K Drive** has a MTBF rating of over 11,000 hours and offers advanced technology and design at an economical price.

Cutting Edge 800K Drive 175.

Spelling Coach Professional by Deneba

Spelling Coach Professional is much more than just a spelling checker, it's a complete reference system. It can spell check your document against Merriam Webster's 9th, Legal, and Medical dictionaries which together contain a total of 158,000 words. You also have instant access to a 245,000 synonym thesaurus, and, the most amazing feature of all: a complete set of definitions. It supports both interactive and batch checking, and the dictionaries can be accessed through a desk accessory or stand alone speller. Powerful and accurate hyphenation routines are available on demand. Easily add your own words to the dictionary for even more power!



Spelling Coach Professional 105.

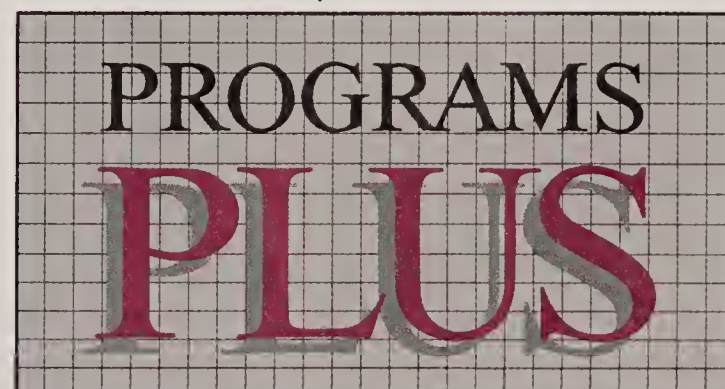
Studio/8 by Electronic Arts

Professional artists and amateurs alike will enjoy the power that **Studio/8** reveals in the Mac II. **Studio/8** is the first full-color, full-feature user friendly paint program designed specifically for artists. It features versatile airbrush, paintbrush, icon-based drawing tools, and color routines that you can customize. You'll be rid of hassles with custom typesetting because **Studio/8** supports full text-editing features in the same text box and allows you to dynamically resize and redefine blocks of type, plus shear, rotate, and skew text. **Studio/8** comes bundled with on-line help, a slide show program with built-in production features, a free font disk, and a library of backgrounds and textures.



Studio/8 309.

Positively A Plus



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& Phenomenal Prices . .

DataBase Management

Acius 4th Dimension	529.	MediaGenic	
4D Runtime	245.	Reports for Hypercard	59.
Apple Computer HyperCard	44.	Focal Point & Business Class Bundle	55.
Ashton Tate dBASE Mac 1.0	295.	Microsoft Microsoft File	119.
Blythe Software Omnis 3 Plus/ <i>Express</i>	275.	Nantucket Software McMax	175.
Borland Reflex Plus	165.	Nordic HyperCONTROL	42.
Claris FileMaker II	Call	Odesta Double Helix II	339.
Ducsoft, Inc. Applications & Routines for 4th Dimension Vol. 1	86.	GeoQuery or DataDesk Professional	295.
Fox Software Fox Base Plus	214.	Park Row Incorporated Publish or Perish	28.
Fox Base Unlimited	259.	ProVUE Development OverVUE 2.1E	149.
Ideaform Hyper Book Maker	31.	Software Discoveries RecordHolderPlus	45.
		Telegraphics Hypertutor	30.

Business Software

Abacus Concepts		Mainstay Capture	42.
StatView II (<i>Mac+</i> , <i>SE</i> , <i>II w/68020 & 68881</i>)	<i>Special</i> 369.	Mac Flow 2.0 or Mac Schedule	115.
StatView SE+ Graphics	229.	Micro Planning Software	
Access Technology Trapeze 2.1	159.	Micro Planner 6.0	349.
Ashton Tate Full Impact	249.	Microsoft Microsoft Excel 1.5	249.
Borland Eureka! The Solver	129.	Microsoft Works 1.1 with Spellswell	189.
BrainPower ArchiText	185.	Owl International Guide 2.0	119.
StatView 512 Plus	175.	Guide Envelope System	99.
Math View Professional	145.	Satori Software	
DataScan	119.	Bulk Mailer 3.2	79.
Bravo Technologies MacCalc	79.	Bulk Mailer Plus	195.
Chang Laboratories		Components GL	<i>Special</i> 385.
C.A.T. Contacts•Activities•Time	229.	Legal Billing	369.
Claris MacProjectII 2.0	395.	Project Billing	439.
Cognition Technology MacSMARTS	135.	Select Micro Systems, Inc.	
Legisoft/Nolo Press WillMaker 3.0	35.	Exstatix or MapMaker	219.
Lundeen & Associates		Shana Enterprises Fast Forms	89.
WorksPlus Commands	60.	Synex Mac Envelope	19.
MacroPac International		Mac Invoice	32.
101 Macros For Excel	44.	Systat Systat 3.2	
		(<i>Specify MacPlus, or Mac II</i>)	459.

Word Processors & Desktop Publishing

Access Technology Mind Write 2.0	95.	LetraFonts (<i>Various Vol. 1-45 ea.</i>)	69.
Mind Write Express	149.	Microsoft Microsoft Word 4.0	249.
Allan Bonadio Associates		Microsoft Write 1.0	113.
Expressionist 2.0	79.	Postcraft International, Inc. Laser FX	115.
Aldus Corporation PageMaker 3.0	475.	Quark, Inc. QuarkXPress V2.0	499.
Ashton Tate FullWrite Professional	275.	Symantec More 1.1C (<i>Color Version</i>)	175.
Claris MacWrite 5.0	119.	Symmetry Acta V2.0	42.
Letraset Ready, Set, Go! 4.5	279.	T/Maker Company WriteNow V2.0	105.
Letra Studio	369.	Word Perfect Corporation Word Perfect	185.

Spelling & Grammar Checkers

Aegis Development		Electronic Arts Thunder! 1.23	30.
Doug Clapp's Word Tools	42.	Lundeen & Associates	
A.L.P. Systems MacProof 3.0	115.	WorksPlus Spell 1.1	46.
Deneba Software		Microlytics, Inc.	
Coach Merriam Webster's Thesaurus 2.0	36.	Word Finder (<i>Synonym Finder</i>)	35.
Spelling Coach 3.0		Sensible Software Sensible Grammar	55.
(<i>Webster's/Medical/Legal/Hyphenation</i>)	54.	Working Software, Inc. Spellswell 2.0	42.
Spelling Coach 3.0 Professional	<i>Special</i> 105.	Lookup (<i>Makes Spelling Suggestions</i>)	29.

Accounting Packages

Aatrix Software Aatrix Payroll V3.0	115.	Insight Expert GL, AR, or AP	479.
Aatrix Payroll Plus	169.	MECA Managing Your Money	129.
Bedford Software Simply Accounting	219.	Migent In House Accountant	119.
Chang Labs		Monogram Business Sense	279.
<i>New Enhanced Version III Modules!</i>		Dollars & Sense 4.0	81.
Rags to Riches 3-Pak 3.1 (<i>GL/AR/AP</i>)	289.	North Edge Software Timeslips III	119.
Rags to Riches GL, AR, or AP	120.	Peachtree Back To Basics Professional	
Dac Software Dac-Easy Light	45.	(<i>GL/AR/AP/INV</i>)	159.
Intuit Quicken	35.	Survivor Software	
Layered Insight One Write	185.	MacMoney 3.0 (<i>Enhanced Version</i>)	62.

Networking Software & Hardware

CE Software Quick Mail	169.	Shiva NetModem V1200	359.
Imagine Software		NetModem V2400	479.
Multi-User Appointment Diary		Net Serial X232	309.
with Smart Alarms	85.	NetBridge	309.
Infosphere		SuperMac Software Acknowledge	349.
MacServe (<i>Network Software</i>)	158.	Multi-User SuperLaserSpool	199.
LaCie Silverserver	99.	Symantec InBox-MacConnection	79.
Microsoft Microsoft Mail 1-4 users	195.	InBox-Starter Kit V2.0	
Nuvotech		(<i>3 Personal Connections</i>)	199.
TurboNet 128/512k or TurboNet Plus	27.	TOPS Tops 2.0 or Net Print	119.
Olduvai Software Clip Share	109.	Tops Repeater	129.
Font Sharer	149.	Tops Teleconnector Din8 or DB9	39.

Graphics Software

3G Graphics Images with Impact!	59.	Dreams	315.
ABA Software Draw It Again Sam 2.0	89.	Laserware Laserpaint Color II	359.
Adobe Systems Adobe Illustrator 88	325.	Letraset ImageStudio 1.5	279.
Adobe Fonts (<i>Various volumes</i>)	Call	Ready Set Show	189.
Aldus Freehand	379.	Macromind Videoworks II	118.
Altsys Corp. FONTastic Plus 2.0	59.	Videoworks II Accelerator	125.
Fontographer 2.2	239.	Videoworks II Driver for Hypercard	60.
Ashton Tate Full Paint	69.	Meta Software Design/2.0	199.
Broderbund Print Shop	36.	Micro Illusions Photon Paint	179.
Casadyware Fluent Fonts 2.0 (<i>2-Disk Set</i>)	26.	Micro CAD/CAM MGMStation	685.
Fluent Laser Fonts Vol. 1-22 (<i>ea</i>)	45.	Micro: Maps	
CE Software Calendar Maker 3.0	28.	MacAtlas Paint 2.0 (<i>MacPaint Format</i>)	45.
Claris MacPaint 2.0	119.	MacAtlas Hyper Atlas	64.
MacDraw II 2.0	309.	MacAtlas Professional	
Cricket Software Cricket Draw	169.	(<i>PICT/MacDraw Version</i>)	129.
Cricket Graph	119.	Microsoft Microsoft PowerPoint 2.0	249.
Cricket Presents	289.	Olduvai Software	
Graphsoft Mini Cad 4.0	375.	Post-ART II (<i>4-Disk Set</i>) or ArtFonts	59.
Deneba Software Canvas DA 2.0	75.	Silicon Beach Software SuperPaint 2.0	109.
Canvas 2.0 (<i>Includes Desk Accessory</i>)	169.	Digital Darkroom	159.
Dream Maker MacGallery		Super 3D	159.
(<i>Hypercard or Paint</i>)	29.	Super 3D Enhanced (<i>Mac II</i>)	249.
Dubl-Click Software		Solutions International	
World Class Fonts: 1-6 (<i>ea</i>)	45.	The Curator (<i>Catalog Your Art</i>)	79.
WetPaint: 1-16 (<i>ea</i>)	45.	Springboard Certificate Maker	24.
Electronic Arts Studio 8 (<i>MacII</i>)	<i>Special</i> 309.	SuperMac Software Pixel Paint	209.
Enzan-Hoshigumi USA		Symmetry	
MacCalligraphy 2.0	109.	Picture Base & Wet Paint Bundle	95.
Japanese Clip Art Scroll I		T/Maker Click Art Letters I, Letters II,	
"Heaven" or Scroll 2 "Earth"	52.	Personal Graphics, Publications, Effects,	
Year of the Dragon	21.	Business Image, or Holidays (<i>each</i>)	28.
Foundation Publishing Comic People	25.	Christian Images	35.
Comic Strip Factory	45.	Click Art EPS Illustrations	75.
Innovative Data Design MacDraft 1.2B	149.	Zedcor DeskPaint 2.0	69.

Educational/Creative Software

Baron's Baron's SAT	35.	Venture's Business Simulator	47.
Bible Research The Word (KJV or NIV)	165.	Deluxe Music Construction Set V2.0	61.
Bogas Productions Studio Session	49.	1st Byte/Electronic Arts	
Bright Star Technology Alphabet Blocks	32.	Kid Talk, Speller Bee,	
Broderbund Jam Session	30.	First Shapes, or Math Talk	32.
Sensei Geometry, Calculus or Physics	60.	Great Wave Software KidsTime	26.
Type!	31.	Learning Company Reader Rabbit	33.
Where in the World is Carmen San Diego?	25.	Mindscape Perfect Score SAT	
Coda Mac Drums	35.	w/The Perfect College	46.
Davidson & Associates Speed Reader II	39.	Nordic	
Math Blaster or Word Attack!	27.	MacKids Educational Programs (<i>each</i>)	28.
Electronic Arts Mavis Beacon Typing	36.	Simon & Schuster Typing Tutor IV	35.

Game Software

Access World Class Leader Board Golf	34.	Firepower	16.
Accolade Hard Ball	23.	Universal Military Simulator	30.
4th & Inches	24.	Might and Magic	37.
Artworx Bridge 5.0	22.	Sky Travel	45.
Avalon Hill Mac Pro Football	30.	Microsoft Flight Simulator 1.02	32.
Baudville Award Maker Plus	29.	Micro Sports MSFL Pro Draft	26.
Broderbund Ancient Art of War		MSFL Pro League Football	32.
or Ancient Art of War at Sea	27.	Miles Computing Inc. Down Hill Racer	24.
ShufflePuck Cafe or Ultima III	24.	Harrier Strike Mission II	
Poster Maker Plus	39.	or The Fool's Errand	27.
Bullseye Software		Mindscape Balance of Power,	
P51 Mustang or Ferrari Grand Prix	32.	Crossword Magic or Citadel	30.
Centron Crapmaster,		Deja Vu: A Nightmare Comes True	30.
Roulettemaster or BlackJack Ace	28.	King Of Chicago or Shadowgate	30.
Electronic Arts Ogre	20.	Defender of the Crown, Colony	
ChessMaster 2000	28.	or The Uninvited	30.
Chuck Yeager Flight Simulator		Practical Computer Applications	
or Life & Death	36.	Lunar Rescue	30.
Starfleet I	37.	MacGolf or MacRacquetball V2.0	35.
Scrabble	27.	MacCourses	34.
One-On-One , Pinball Construction Set,		Primera Smash Hit Racquetball II	21.
Seven Cities of Gold, SkyFox, or		Sierra On-Line Leisure Suit Larry	23.
Patton vs Rommel	15.	Space Quest or Space Quest II	30.
EPYX Winter Games		Police Quest	30.
or Sub Battle Simulator	24.	Silicon Beach Software	
Greene, Inc. Crystal Quest	27.	Dark Castle or Apache Strike	27.
Crystal Quest w/Critter Editor	42.	Beyond Dark Castle	27.
Hayden Software Sargon IV	29.	Simon & Schuster	
H.J.C. Software, Inc.		Star Trek (<i>The Kobayashi Adventure</i>)	24.
Air Traffic Control Simulator	35.	Star Trek (<i>The Promethean Prophecy</i>)	24.
Infinity Software, LTD.		Sir-Tech Mac Wizardry	35.
Go or GrandSlam Tennis	27.	Sphere, Inc. Tetris	23.
Infocom Leather Goddesses of Phobos	24.	GATO, Orbiter, Falcon, or Pt-109	26.
Beyond Zork, Zork Trilogy or QuaterStaff	30.	Solitaire Royale	19.
Hitchhiker's Guide to The Galaxy	18.	Studio Zero Orbital Mech	35.
Zork Zero, Show Gun or Journey	42.	XOR Software NFL Challenge	64.
MediaGenic Shanghai or Jinxter	24.	Pro Challenge or Basketball Challenge	30.

Positively A Plus!

Disk Drives/Hard Disks/Upgrades

Applied Engineering		MacSnap 524E (512E to 1MB)	265.
MacRAMS (1 MB SIMMS Mac+, SE, II)	489.	MacSnap 524S (512E to 1MB w/SCSI)	409.
AST Research		MacSnap 548 (512K to 2MB)	599.
Mac286 Co-Processor (Mac II)	Call	MacSnap 548E (512E to 2MB)	585.
Central Point		MacSnap 548S (512E to 2MB w/SCSI)	649.
Central Point 800K External Drive	185.	MacSnap Plus 2 (MacPlus to 2MB Non Expandable)	475.
CMS PRO-II Series 60-II/I	735.	MacSnap 2SE or 1024 Option (1 MB Acc. or MacII Memory Exp.)	475.
Compact Series SC30 (Mac+/SE/II)	649.	SCSI Interface/Port	129.
Compact Series SC45 (Mac+/SE/II)	859.	MacSnap Toolkit (torx driver, opener & grounding set)	15.
SDSeries MacStack SD20 (Mac+/SE/II)	569.	Everex Emac 20D (20Mg Hard Disk)	520.
SDSeries MacStack SD30 (Mac+/SE/II)	615.	Emac 20 Deluxe	585.
SDSeries MacStack SD60 (Mac+/SE/II)	849.	Personal Computer Peripherals	
PRO-SE Series 30SE/I or 30SE/R	535.	Beige or Platinum Color. Optional Built-In Modems Available.	
PRO-SE Series 45SE/I or 45SE/R	735.	MacBottom HD-21 (20+MB SCSI Hard Disk)	659.
60MB Tape Backup (Mac+/SE/II)	785.	MacBottom HD-32 (32MB SCSI Hard Disk)	699.
Cutting Edge		MacBottom HD-45 (45MB SCSI Hard Disk)	859.
Cutting Edge 800k Drive	Special 175.	MacBottom HD-70 (70MB SCSI Hard Disk) Plat only	999.
Cutting Edge Wedge XL 30 Plus SCSI Hard Drive	Special 629.	Rodime Rodime 20 Plus Ext.	629.
Cutting Edge Wedge XL 45 Plus SCSI Hard Drive	Special 829.	Rodime 45 Plus (Ext. 45MB SCSI)	939.
Cutting Edge XL 30 Internal Hard Drive	505.	Rodime 450RX (Int. 45MB Mac SE/II)	829.
Cutting Edge XL 45 Internal Hard Drive	645.	Rodime 100 Plus (Ext. 100MB SCSI)	1169.
Dove Computer Corporation		Rodime 140 Plus (Ext. 140MB SCSI)	1319.
68020 Accelerator Boards for Mac SE		Rodime 1000 RX (Int. 100MB MacII)	1045.
MSE 1 (16 Mhz)	585.		
MSE 2 (16 Mhz w/1MB)	1059.		
MSE 3 (16 Mhz w/Math Co-processor)	779.		
MSE 4 (16 Mhz w/1MB and Math Co-processor)	1255.		
MacSnap 524 (512K to 1MB)	325.		

Printers & Digitizers

AST Research TurboLaser P/S	3559.	Seikosha SPI000 (Imagewriter Comp.)	229.
TurboScan (Sheetfeed model)	1199.	Summagraphics Bit Pad Plus	335.
TurboScan (Flatbed model)	1329.	ThunderWare	
Koala Technologies Corp.		ThunderScan V4.0 with Power Port	199.
MacVision 2.0 (Digitizer)	225.	Mac II Power Accessory	42.
Kurta IS ADB Tablet	259.	Video Technology	
Cordless 4 Button Cursor	99.	Laser 190 A (Imagewriter Compatible)	249.

Accessories

Abaton ProPoint (ADB Mouse for Mac SE & Mac II)	99.	Tilt/Swivel	22.
Asher Engineering		Apple Security Kit	34.
Turbo Trackball (Mac & Mac+ or Mac SE & Mac II)	69.	Antiglare Polarizing Filter	33.
CH Products		Modem/ Fax Protector 10	15.
Mach IV Plus: Quad or ADB	65.	Modem/ Fax Protector 20	29.
Mirage: Quad or ADB (Turns Joystick Into Mouse)	39.	Power Tree Surge Suppressors (10, 20, or 50)	Call
Curtis Manufacturing		Printer Muffler Stand (80 & 132)	21.
Emerald-Surge Suppressor-SP-2	36.	Printer Muffler 80	43.
Ruby-Surge Suppressor-SPF-2	55.	System Saver Mac (Beige or Platinum)	64.
Cutting Edge Cutting Edge EADB-105 Keyboard (Mac SE & Mac II)	135.	Super Base	34.
DataDesk		System Saver SE	59.
MAC-101 Keyboard/ Beige (128k/512k & MacPlus)	Special 139.	Masterpiece Mac II	105.
MAC-101 ADB Keyboard/ Platinum (Mac SE & Mac II)	Special 139.	New Turbo Mouse (Reg. or ADB)	109.
Ergotron Mousecleaner 360°	15.	Mobius Fanny Mac QT (Beige or Plat.)	65.
MacTilt or MacTilt SE (Platinum Color)	68.	Mouse Systems A+ Mouse (MacPlus)	65.
Farallon MacRecorder Sound System (Mac SE or Mac II)	145.	A+ ADB Mouse (Mac SE/ Mac II)	85.
Impulse Audio Digitizer w/soundware	149.	Moustrak MousePad 7"x9" Size	8.
I/O Design Mac Luggage in Navy		MousePad 9"x11" Size	9.
Macinware Plus Carrying Case	64.	Orange Micro Grappler C/Mac/GS	84.
Macinware SE Carrying Case	76.	Grappler L/Q	98.
Imageware II Carrying Case	49.	Ribbons	
HDware	54.	Available in Black, Blue, Brown, Green, Orange, Purple, Red, Yellow, Silver & Gold	
Kalmar Designs		ImageWriter Ribbon	4.
Teakwood Roll-Top Disk Cases:		ImageWriter Black 6-pack	20.
Micro Cabinet (holds 45 disks)	14.	ImageWriter Rainbow Pack (6 Colors)	20.
Double Micro Cabinet (holds 90 disks)	23.	ImageWriter II-Four Color Ribbon	9.
Triple Micro Cabinet (holds 135 disks)	32.	ImageWriter LQ Black	17.
Kensington External Disk Drive Cover	8.	ImageWriter LQ Four Color	20.
Extra Long ADB Keyboard Cable	25.	Seikosha Ribbon Black	6.
Macintosh II Stand	20.	Silicon Comforts MacChimney	
Macintosh II Monitor Extension Cable	33.	(Very Effective Cardboard Laminate Convection Cooling Device)	16.
Mouse Pocket (Reg. or ADB)	8.	Smith & Bellows	
Mouseway (Mousepad)	8.	Mahogany Disk Case (holds 96)	30.
ImageWriter or ImageWriter II Cover	9.	Sopris Softworks	
Macintosh Plus/SE Dust Cover	9.	High Trek Carry Cases - Platinum Gray, Navy	
Macintosh SE w/extended Kybd Cover	9.	Imagewriter II Case	49.
Mouse Cleaning Kit w/Pocket	17.	Macintosh Plus, SE w/Standard Kybd	59.
Disk Drive Cleaning Kit	20.	Macintosh SE & Extended Kybd Case	69.
		Targus (Canada)	
		Imagewriter II Carry Case Blk.	45.
		Macintosh Plus Carry Case Blk.	59.
		Deluxe MacPlus-XKB Blk.	65.

Blank Media

Single Sided 3 1/2" Diskettes		Centech 3 1/2" DS/DD Color Disks (10)	19.
Bulk (Sony) 3 1/2" SS/DD Disks (10)	12.	Sony 3 1/2" DS/DD Disks (box of 10)	18.
Sony 3 1/2" SS/DD Disks (box of 10)	13.	Fuji 3 1/2" DS/DD Disks (box of 10)	19.
Double Sided 3 1/2" Diskettes		Maxell 3 1/2" DS/DD Disks (box of 10)	20.
BASF 3 1/2" DS/DD Disks (box of 5)	9.	Verbatim 3 1/2" DS/DD Disks (box of 10)	19.
Bulk (Sony) 3 1/2" DS/DD (10)	17.	3M 3 1/2" DS/DD Disks (box of 10)	20.

Modems

Abaton InterFax 12/48	415.	Novation	
Anchor Automation		Novation Parrot 1200	109.
MacPac 2400E w/software & cable	179.	Practical Peripherals	
AST		Practical Modem 1200SA	109.
AST-2x2400 (MacPlus/SE/II)	625.	Practical Modem 2400SA	189.
Epic		MacCommpack (2400SA w/Microphone & Cable)	249.
Epic 2400 Int. SE	315.	Prometheus	
Epic 2400 Int. Mac II	315.	Promodem 2400M Ext. (Software & Cable)	199.
Epic 2400 Mini Ext. (Hayes Compatible)	155.	Promodem 2400 (Hayes Compatible)	309.
Everex		Supra Corporation	
Emac 2400 Baud	225.	Supra Modem 2400	Special 149.
Hayes Microcomputing		U.S. Robotics	
Smartmodem 1200	299.	Courier 1200 (Hayes Compatible)	199.
Smartmodem 2400	449.	Courier 2400 (Hayes Compatible)	349.
MDIdeas Commlink 2400	189.	Courier 2400E (Hayes Compatible)	379.
Migent		Courier HST 9600 (Hayes Compatible)	689.
Migent Pocket Modem (ext. 300/1200 Baud)	115.		

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Monday thru Friday 9 A.M. to 9 P.M.
Saturdays 10 A.M. to 6 P.M. (Eastern Time)

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RETURNS

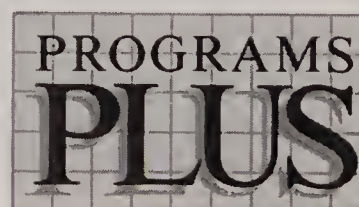
- Defective software will be replaced immediately by the same item. Defective hardware will be replaced or repaired at our own discretion. Call customer service at (203) 378-3662 to obtain a Return Authorization Number before returning goods for replacement. Products purchased in error subject to a 20% restocking fee.

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In my own case, I still have nightmares about what could have happened if I'd been infected just a few months ago, when an entire book-manuscript-in-progress rested on my hard disk. What if those files, along with the ones I had scrupulously backed up, had been compromised in such a way that I couldn't print them out? My imagination fails when I consider what my reaction might have been, especially if sharp objects or strong barbiturates had been at hand when I discovered the damage.

Strained Relations

Yet, even after my unnerving bout with the prospect of data meltdown, I am reluctant to join what seems to be a growing lynch-mob mentality of those rightfully offended by this phenomenon. Insulting the perpetrators of these destructive acts and wishing them dead adds little to what I consider a form of dialogue between the virus criminals and the user community. I compare this situation to the still-controversial one involving "crackers" who break into restricted information networks that store credit-card information or government secrets. To me, the issue was not that

clever teenagers were breaking into the networks, but that our system so blithely encouraged storage of sensitive data on such vulnerable networks.

The underlying message of the virus spreaders might be more complex. After all, it is not only networks that suffer from viruses, but single-computer users as well, who could contract infection not only from downloading software, but also from loading corrupted commercial programs. Fear of viruses provides an unhappy disincentive to the free exchange of information. How could viruses be anything but an unmitigated blight?

Only in this: viruses might be the last warning we have about how deeply dependent we're becoming on our computers. The success of personal computers is now unquestionable. As a result, our culture is taking a giant step into the unknown. Who can predict the secondary impact of total computer saturation? I know my experiences with the Macintosh and the Apple II that I previously owned have changed my life for the better, but I also see an age approaching where my dependence on the Mac and its descendants will be so complete that I will be unable to assess its effect by such glib qualitative criteria. Did

the automobile make our lives "better"? Did television? Of course—but both were instrumental in destroying many of our most deeply held values.

So perhaps the virus scare is giving us an opportunity to take a deep breath and assess our surroundings one more time before we take the plunge into a future where data handling becomes so important that a clever 14-year-old can throw an electronic monkey wrench into all we hold dear. Realistically, I see no alternative to pushing forward with the computer revolution. And I *want* the benefits of that revolution in my own life.

But just the other day the newspapers ran a story about a ring of child molesters who kept track of their victims by personal computers. For just a second, I thought the world could use a few more computer viruses. Of course, I came to my senses, and if you ask me now what I think about viruses, I will mouth the requisite condemnations. Because there really is no other alternative to the future, where Vannevar Bush and George Orwell arm wrestle daily, and every silver lining has a thundercloud. □

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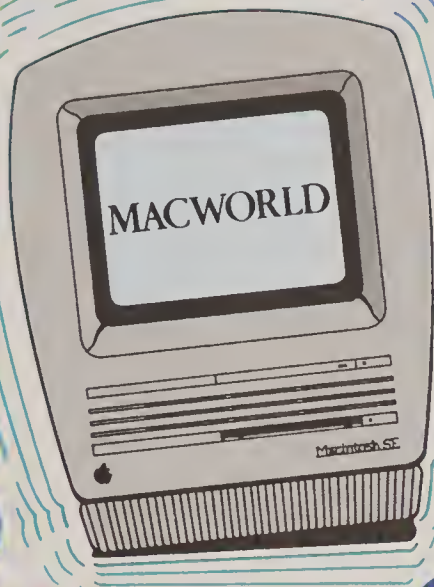
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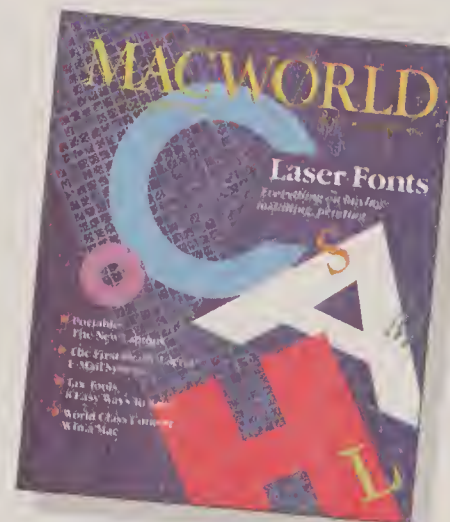
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get flying right from the start. MacWeek summed it up rather well, "MacCalc answers the frustration of Excel users — MacCalc is exceptionally easy to use."

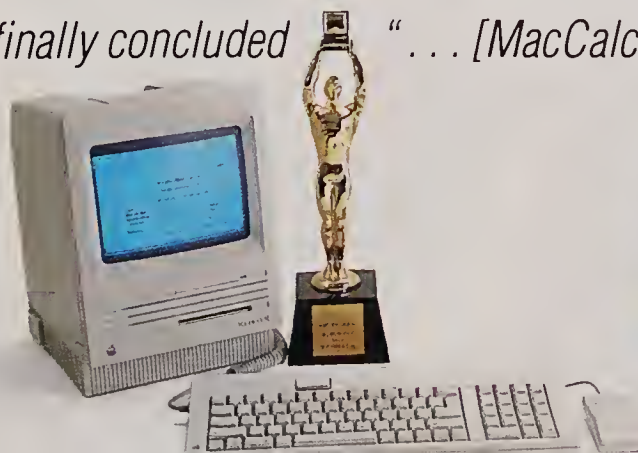
*W*ith desktop publishing level formatting abilities, MacCalc users produce stunningly professional presentations of their information, and that lets them get their point across not only faster, but better. With unique fonts, sizes, styles, and/or formats for each cell, individually variable row heights as well as column widths, you can highlight important numbers, make titles stand out. . . in other words, make your point.

Style

*M*acCalc's extensive list of features include: Lotus 1-2-3 file/SYLK data compatibility; cell notes; on-line help; intelligent database functions; keystroke macros (via Apple's MacroMaker); and much more.

*W*ith MacCalc's list price only \$139, Infoworld concluded that MacCalc is "the clear value leader." MACazine stated unequivocally that "MacCalc is the spreadsheet of choice for those who want useful functionality without undue complexity," and finally concluded "... [MacCalc] is a must have."

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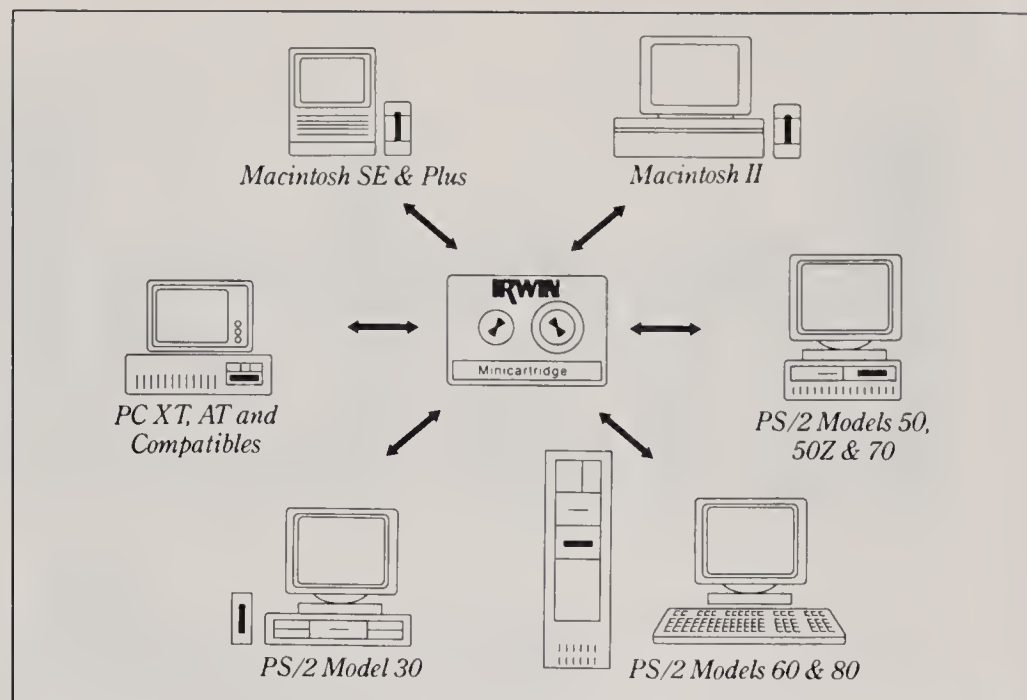
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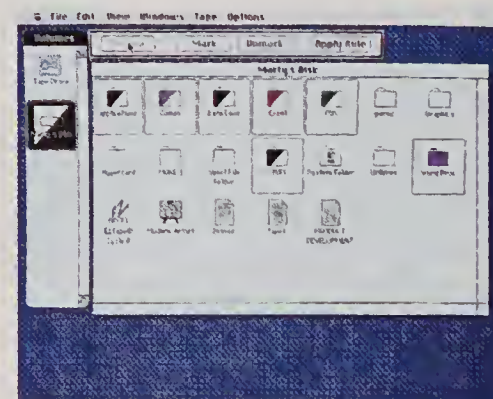
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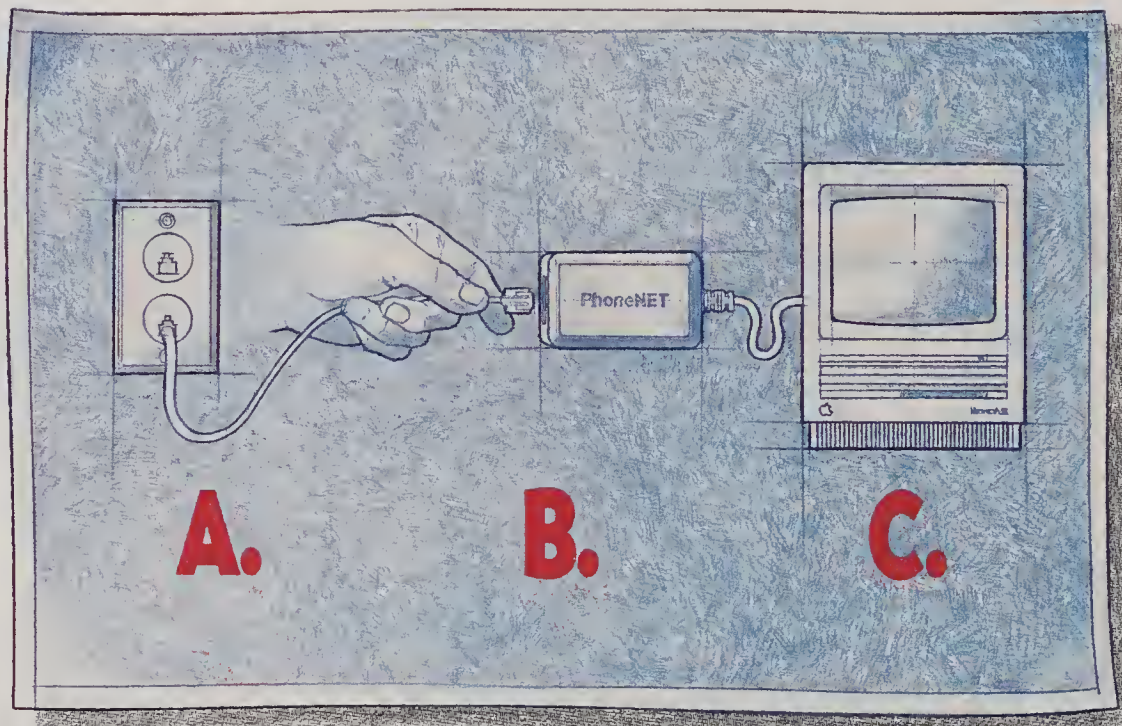


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Macworld News

by Ann Garrison

Apple Connects with New Scanner



Scanners that convert hard-copy images into a screen format aren't new to the Mac, but an Apple scanner is. Apple's flatbed scanner, the AppleScanner, provides a computer connection to almost anything on paper. Apple has priced the unit at \$1799, including software, to encourage both users and developers to take advantage of the billions of color and black-and-white images currently available.

The AppleScanner plugs into the SCSI port of the Mac and fires up with AppleScan or HyperScan software. HyperScan was written by HyperCard inventor Bill Atkinson largely as a quick and simple way to bring graphic images into HyperCard stacks. It can reduce or enlarge images, change the contrast or brightness of a scan, overlay an image with any one of 36 screens, or sharpen an edge. And HyperScan is fast, inputting an image into HyperCard in about two minutes.

AppleScan is more complex. It can assign any one of 16 gray levels (4 bits per pixel) to each pixel, resulting in an image that is more photographic than HyperScan's high-contrast images, in which each pixel is either black or white. While other scanners offer up to 256 levels of gray (8 bits per pixel) to assure true photographic quality, Apple decided on 16

levels of gray to match the capabilities of its laser printers.

AppleScan can input line, halftone, or gray-scale art and can scale an image from 25 to 400 percent, depending on the output resolution, which can vary from 75 to 300 dots per inch (dpi). User-adjustable controls include brightness, threshold, and contrast. You can establish settings easily within the settings dialog option, which allows you to quickly test the results of various settings and then print examples. You pick the one that looks best and use the associated settings.

The AppleScanner also supports optical character recognition (OCR) software such as Caere's OmniPage, which allows the scanner to scan text that can then be edited with a word processor.



MARK JOHANN

Apple's new scanner fires up with HyperScan software for users seeking speed, or AppleScan software for users working with complex or photographic images.

Apple's scanner also directly supports the AppleFax modem, enabling you to scan a document and send it to any fax machine for printing. This technique significantly increases the quality of the resulting image over that offered by a traditional fax-to-fax system. For further information, call Apple Computer in Cupertino, California, at 408/996-1010.

3-D Animation



MacroMind, creator of VideoWorks, has announced 3D Works and RenderWorks, three-dimensional animation and rendering packages capable of animating sequences and individual frames, and shading the final images. Based on the Twixt animation software de-

veloped by Julien Gomez at Ohio State University, 3D Works offers a VideoWorks-like interface and a score. One of the program's strengths is its flexibility in controlling an animated object's motion. After setting the start and end points, the animator can choose from a variety of paths for the object to travel: linear or cubic spline (B-spline, bezier, and Catmull-Rom). 3D Works interpolates the object's positions for movement along the path. The animator also controls whether the object moves at a constant velocity or accelerates from a standstill to a set speed.

RenderWorks can apply a number of different algorithms to render or draw the final objects in a frame. Objects can be rendered with a faceted surface, shaded using the Gouraud

(continues)

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or Phong models, or drawn with a reflection map, texture map, or bump map applied to the surfaces.

The number of objects or light sources that may appear in a scene is unlimited, and the light sources and camera can be attached to other objects. The program generates opacity information and can store and retrieve that data from 32-bits-per-pixel video display boards using an alpha channel buffer.

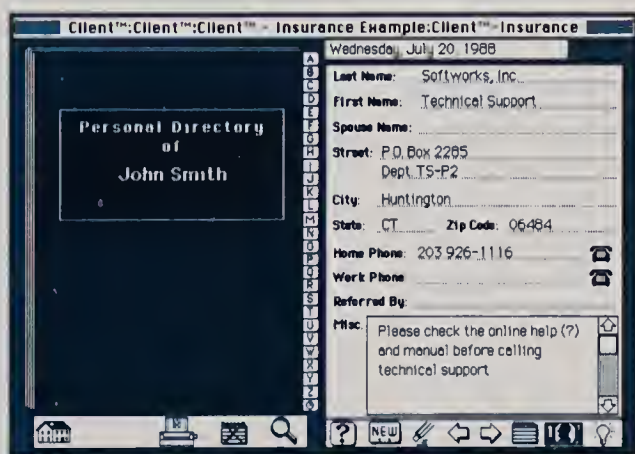
3D Works has another unique feature: it can animate an object's transformation from one shape to another by interpolating the intermediate shapes when the animator specifies a start and end shape.



MacroMind's 3D Works and RenderWorks can render, animate, and shade 3-D images.

3D Works will import files from 3-dimensional modeling programs such as Super 3D, Swivel 3D, Pro 3D, and Dimensions. 3D Works outputs files in Pixar's RenderMan format. Animation data is stored in scripts in a format that MacroMind will make publicly available. The program also reads 3DGF data. A preliminary version of the program is scheduled to ship in September. —David Ushijima

Softworks' Client is an information database that salespeople can use to hold information about each of their customers.



HYPERCARD

Building Stacks Better and Faster



In addition to Client, a \$195 HyperCard stack that serves as a client information database, Softworks is offering HyperTools #1 and HyperTools #2 (\$99.95 each), utility packages that extend the functionality of stacks.

Both packages present their tools as buttons on the startup card. HyperTools #1 and #2 each contain sixteen tools (four of which appear on both disks). HyperTools #1 includes tools to help you install, align, and create arrays of fields and buttons. HyperTools #2 offers data formatting and validation, font viewing, sorting, and other stack-building tools. The utilities come with indexed manuals, and their scripts are not protected.

HyperTools #1 and #2 are intended to help stack builders and script writers build stacks better and faster. However, novice script writers should be forewarned that the effort to understand and use prewritten HyperTalk code can often be as substantial as the effort to write code from scratch.

The Client stack is geared for use by salespeople. Fields are designed to hold information about each customer's access, contact history, financial background, and interests. The stack helps implement HyperCard's reporting and mailing-list functions. Like many HyperCard-

based database applications, Client is painfully slow. The scripts are password-protected.

For further information, contact Softworks in Huntington, Connecticut, at 203/926-1116.

these graphics into Aldus PageMaker or Letraset's ReadySetGo to generate hourly summary reports for senior strategists.

Delegates on the floor even received Mac-generated flyers



Dukakis strategists used Macs, a DEC MicroVAX II, and DEC terminals to track trends on the Democratic Convention floor.

Mac/VAX Connection Tracks Demos



When Michael Dukakis's presidential campaign bandwagon got rolling at the Democratic National Convention in Atlanta, Macintoshes were part of the action. Dukakis campaign strategists depended on a computer system composed of Macs, a Digital Equipment Corporation (DEC) MicroVAX II, and DEC terminals to track delegate opinions and trends on the convention floor.

Dukakis whips wandered the floor, gathering background and information on the delegates' positions on the issues. Using DEC terminals, other campaign workers entered the information into a MicroVAX database.

Meanwhile, Mac users stationed at the Dukakis headquarters accessed the database with Pacer Software's Pacer-Share to generate graphs and charts with Access Technology's Trapeze. Staffers then imported

and newsletters. The flyers included digitized pictures of Dukakis and his key supporters, created with a Canon still-frame camera, PixelLogic's Pro-Viz digitizer, and a Microtek scanner.

The information system at the convention was developed by SIS, which used the VAX for speed and storage, the Mac for graphics and data analysis, and connectivity software to tie everything together. For more information on the system, contact SIS of Boston, Massachusetts, at 617/720-5500. —Brita Meng

HYPERCARD

Hot Stacks



Check with a user group or bulletin board about obtaining these hot new freeware or shareware HyperCard stacks:

Deprotect by Ned Hovath and Allan Foster. A password-

(continues)

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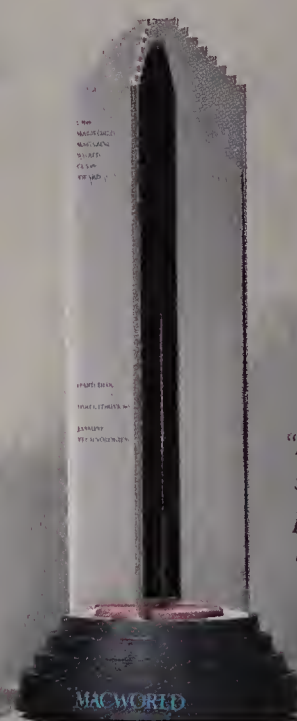
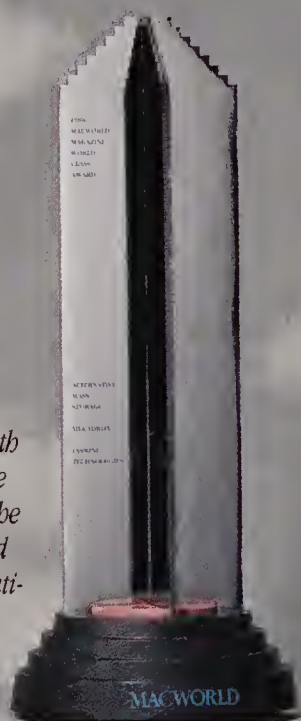
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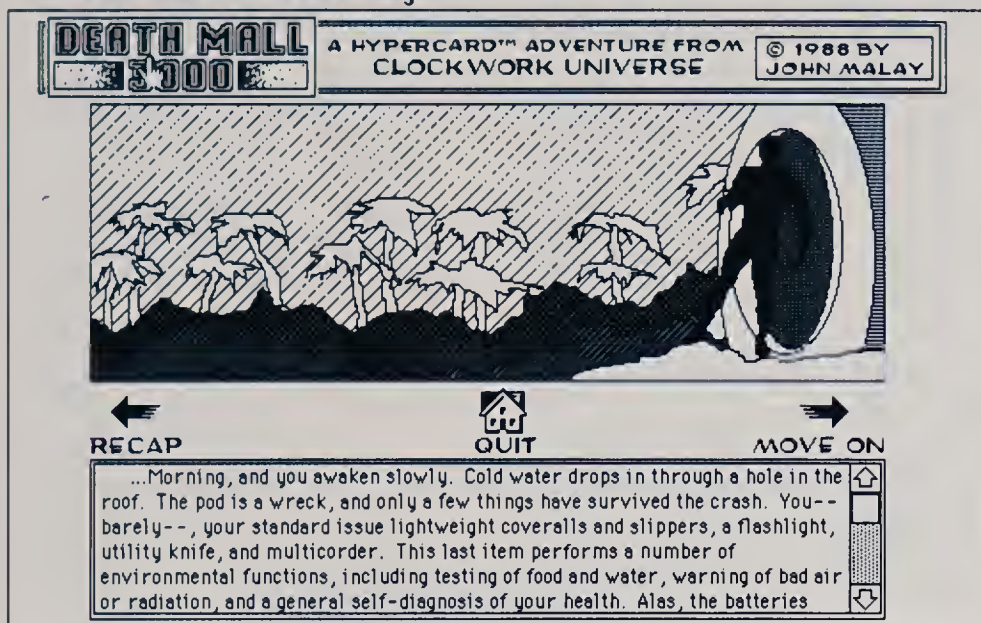
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MacWeek

File Edit Go Tools Objects



Death Mall 3000 takes you on an elaborate HyperCard adventure in a futuristic shopping mall. Encounter intergalactic creatures as you make your way through the mall.

protected stack is a crippled stack. This gem is a must for everyone. It asks you to find the file to be deprotected in a standard file dialog box, then removes the password protection.

Mass Compacter by Brian D. McLean. A great tool to combat the problem of wasted free space in stacks. Lets you compact multiple stacks in a folder or drive by simply specifying a directory name.

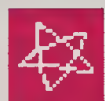
Texas by Mark Zimmermann. A monster word-indexer. It takes any text-only file and creates an auxiliary file listing every word in the file and the number of times it occurs. You can search for each word's context and merge this word list file with others. Like a compiled application (XCMDs do all the work) with a HyperCard front end.

The H & C Train-Set by M. Ristau. For model train buffs, this slow-moving choo-choo lets you lay out your own track and directional switches.

Maze Maker by Steve Merel. Use the arrow keys to work your way through a maze. This stack lets you build and save your own mazes. The action is simple, yet addictive.

Death Mall 3000 by John Malay. An elaborate and well-drawn adventure game (go east, west, north, south) set in a shopping mall.—*Scott Kronick*

Apple's New Developer Tools



Writing Macintosh software is no piece of cake, but Apple's Developer Tools Group hopes to make it easier by the end of 1988 with the release of three new software development tools that were initially written for internal use by Apple's Software Quality Assurance Test Tools Team.

RAMdump lets you dump the entire contents of RAM to a floppy disk, which can be especially useful after a program crash. By having a floppy copy of a crashed Mac's memory (RAM) contents, you can examine and debug problems at any time—even long after a crash. Beta testers should find it a good way to send information on software crashes to the software developer.

RAMdump's partner is an application called ReAnimator, which re-creates the crash with

the RAMdump information. It lets a programmer see exactly what was going on in the Mac when the program crashed. For example, instead of asking a beta tester for a list of INITs in the system, a developer can get the information from ReAnimator.

The third tool, Extended Discipline, helps to catch and identify incorrect parameters for Mac Toolbox calls. It will work with any Mac debugger that supports Apple's defined Extended Discipline interface. Not only does it find inconsistencies in a programmer's code, but it also requires the programmer to write code according to Apple's programming guidelines.

Apple has another research project in progress called Player Piano, which allows automatic testing of applications with scripts. It requires one Mac to control the script, and another to execute the application being tested. The controller feeds events—open window, save file, and so on—to

the executing Mac over AppleTalk. Currently, this type of testing is done manually at Apple. With Player Piano, you can concentrate on writing scripts for extensive automatic testing and stop wasting time on manual testing. For further information, contact Apple Computer, Developer Tools Group—Test Tools, 20525 Mariani Ave., MS: 275, Cupertino, CA 95014, 408/996-1010.—*Brita Meng*

HYPERCARD

How Readers Use HyperCard



In just one year, HyperCard has gone from being a gleam in author Bill Atkinson's eye to being one of the most popular major applications on the Macintosh. Fifty percent of the 483 individuals who responded to

(continues)



Apple's Software Quality Assurance Test Tools Team will release three new Mac software development tools—RAMdump, ReAnimator, and Extended Discipline—by the end of 1988.

ROBERT HOLMGREN

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Circle 405 on reader service card

Macworld's latest reader survey currently use HyperCard. (Surveys were mailed to 1000 randomly selected readers.) Forty-seven percent of respondents using HyperCard reported purchasing the program. The others had obtained the program either with a new Macintosh or from a bulletin board, friend, or dealer. An impressive 76 percent of respondents using HyperCard felt it played an important part in increasing their capabilities, although 21 percent found it difficult to use.

Ninety percent of respondents using HyperCard said they had used the Browsing mode, and only 6 percent of those who had tried Browsing found it difficult to use. The same was true of the 83 percent who had tried the Typing mode; only 6 percent of those who used Typing found it difficult.

While these HyperCard users wanted to see some improvements added—such as report-printing capabilities, more speed, the ability to fill large screens, color support, and more programming capabilities—30 percent said HyperCard had already led

Which, if any, of the following improvements should be made to HyperCard?

Color support 34%

Large-screen support 40%

Report-printing capabilities 72%

Programming capabilities 39%

Speed 47%

Based on 240 respondents who currently use HyperCard.

Of 483 people who responded to our readers survey, 50 percent use HyperCard, and most are looking for improvements.

them to purchase another Macintosh product.

With the fruits of HyperCard to be found in over 1000 stacks currently available on public domain bulletin boards and in a rising number of commercial products, more and more people are probably wondering, OK, Bill, what's next?

Ray Tracing for Mac IIs



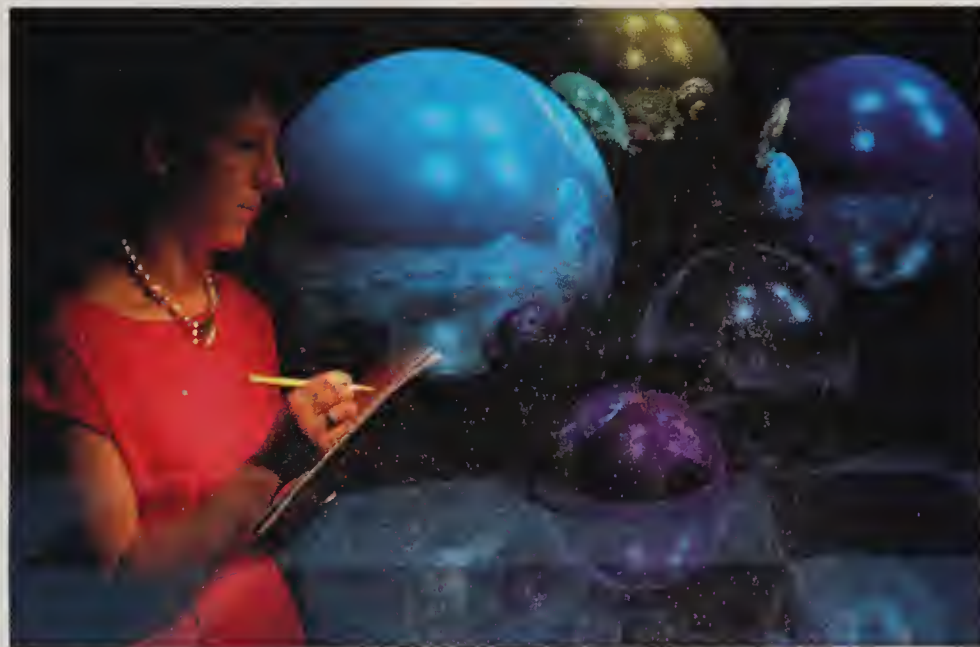
Ray tracing has long been the domain of mainframes and mini-computers. Ray-tracing algorithms simulate the path of light rays from a light source to a viewpoint, creating photo-realistic images, but the process takes hours or even days of computation. When a ray encounters an object while rendering an image, the algorithm must take into account not only the properties of the object (is

it opaque, transparent, translucent, reflective, or textured?), but also the object's relationship to other objects (will shadows hit it, will other objects be reflected in it, will it be reflected in adjacent surfaces?). If you've seen computer graphics depicting reflective spheres floating above a checkered ground, you've seen the classic ray-traced scene.

Amazingly enough, a sophisticated ray-tracing program is being converted to run on the Mac II. Ray Tracing Corporation of Palos Verdes Estates, Califor-

ing features such as shadow casting, reflections, refractions, texture-mapping, compositing, several levels of antialiasing, multiple colored-light sources, and water-simulation equations. MacTracer saves files in PICT format for printing to film recorders, laser printers, or videotape, or pasting into color graphics programs such as PixelPaint.

For further information, contact Ray Tracing Corporation, 2516 Via Tejon, #316, Palos Verdes Estates, CA 90274, 213/373-2998.—*Erfert Fenton*



Ellyn November of Ray Tracing Corporation shows off the graphic power of MacTracer, a sophisticated ray-tracing program.

nia, plans to release MacTracer this winter. Priced at \$895, MacTracer will run on a Mac II with 4MB of memory and an 8-bit or 24-bit color card. This high-end desktop tool will enable an architect to realistically simulate a building and its environs, for example, or a scientist to illustrate a molecular structure.

According to Ray Tracing's president, Greg Passmore, the company's programmers are squeezing an existing program that runs on high-end graphics computers into the Mac II and adding a Mac-like interface, while retaining much of the functionality of the original program. MacTracer's modeler creates 3-D models in memory; rendering algorithms then produce a realistic image, employ-

NuBus Interface and Controller



A key part of Apple's strategy to break into the workstation mar-

ket is Texas Instruments' 32-bit NuBus architecture for the Mac II. But as Apple and TI have learned from potential third-party coprocessor board developers, designing an interface to implement the NuBus protocol has been an arduous and time-consuming task.

TI and Apple have responded by creating a new interface

(continues)

Which HyperCard modes have you tried?

Browsing 90%

Typing 83%

Pointing 75%

Authoring 65%

Scripting 59%

How to shoot a moose with your Mac.

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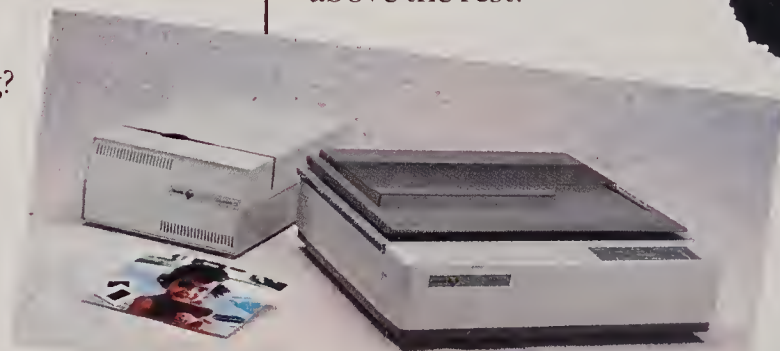
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Circle 254 on reader service card



Texas Instruments' new chip set uses the NuBus protocol to cut NuBus board design time.

meant to trim NuBus board design time from two months to two days. Instead of asking potential developers to implement a custom interface using a programmable logic device, TI has introduced a chip set that implements the NuBus protocol. The chip set includes a 32-bit interface controller chip and a 16-bit transceiver chip, both of which are capable of replacing as many as 45 discrete logic devices. Thus, space devoted to the NuBus interface on an add-in board has been reduced from 10 to only 3 square inches. Board makers can use the extra real estate to add memory or features.

These changes, of course, are supposed to encourage the development of more specialized add-in boards for the Mac II. According to Levco's vice president of software, Duane Maxwell, there was a lot of duplicated effort among people working on the NuBus card interface, which was crying out for a single- or multiple-chip solution. "The new interface is a hardware version of a common library of routines," he says. "It will encourage people using other bus technology, like VME, to write to NuBus."

In addition, TI plans to make a separate, 16-bit CMOS controller chip available in December for Apple's Macintosh Coprocessor Platform (MCP). Originally introduced to aid third-party developers of hardware and software products, the MCP card has been outfitted with a specialized operating system called MR-DOS, otherwise known as multiprocessing real-time disk operating system. Apple reportedly built its token ring add-in card using MR-DOS and the MCP.—*Rusty Weston*

Max Headroom, Move Over

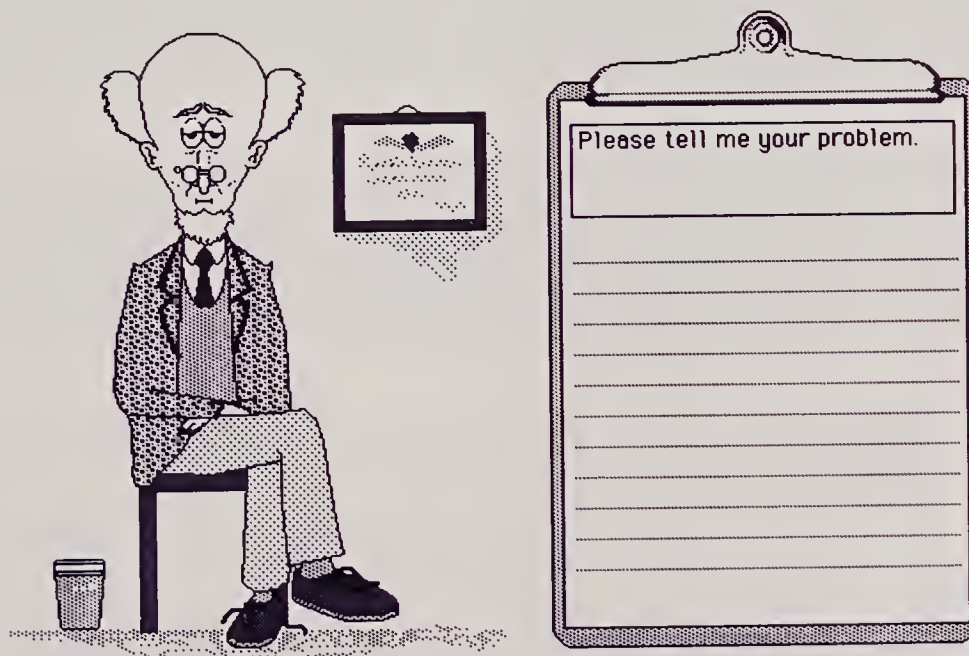


Hyperanimation was popularized by John Sculley, who has been showing a videotape of the Knowledge Navigator in which a talking-head agent carries on a dialog with a man using a futuristic computer. The agent greets the user, reminds him of appointments, and fetches information from databases just for the asking.

If you've ever wanted your own Max Headroom, now's

your chance to have what might be a real anthropomorphic agent. HyperAnimator, which Bright Star Technology claims is the next component needed to realize true artificial intelligence, combines animated faces with sound to enhance HyperCard stacks or other applications with interactive talking heads. Its random-access animation automatically synchronizes vocal sounds with vigorous lip movements to create the illusion of programs that talk.

HyperAnimator can accept images from a wide variety of sources including digitized video, hand-drawn cartoons, and automatically produced claymation. Or you can hook it up directly to an inexpensive robot, such as Teddy Ruxpin. The audio portion can come from sound digitizers, such as Farallon Computing's MacRecorder, or any voice synthesizer. It comes in two versions: HyperAnimator (\$149) adds synthetic actors to HyperCard stacks; HyperAnimator Developers Toolkit (\$495) allows software houses to apply hyperanimation to their own applications. For more information, call Bright Star Technology in Bellevue, Washington, at 206/885-5446.—*R. Colin Johnson*



Siggi is one of many interactive talking heads in Bright Star Technology's HyperAnimator. You can also talk to the Starlet, the Professor, and the Secretary.

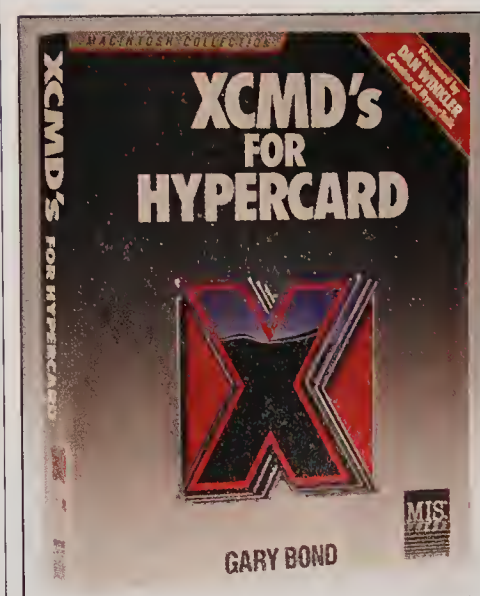
HYPERCARD

XCMDs for HyperCard



No sooner does HyperCard provide a programming language for the rest of us than along comes a book about an aspect of the language only an advanced user can understand.

XCMDs are computer language subroutines that extend HyperTalk, HyperCard's programming language. Once created by the user in a language such as Pascal, C, or Assembly,



Gary Bond's book explains HyperTalk-extending subroutines.

these subroutines operate identically to the built-in commands and functions of HyperTalk. Unlike HyperTalk, building XCMDs is not for the uninitiated.

Gary Bond's *XCMD's for HyperCard* (MIS Press, 1988) is the first book to specifically address HyperTalk's extensions. Each of the many examples are presented in both Pascal and C. In fact, so much of the book is dedicated to providing programming examples, it is surprising that programmer Sioux Lacy, who converted the Pascal examples into C, was not given coauthor status.

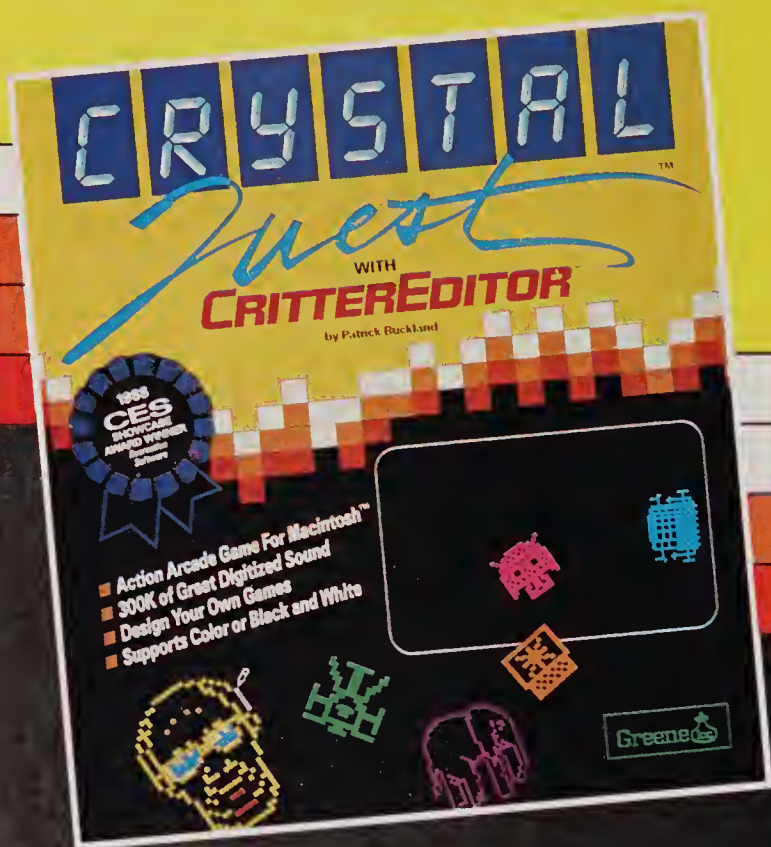
Prior to this book's publication, technical information on XCMDs had been almost non-

(continues)

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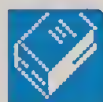
Circle 137 on reader service card

existent. Thus, programmers who have not yet conquered the quirks and complexities of HyperTalk extensions ought to find Bond's book extremely useful. In addition to describing XCMD fundamentals and the HyperTalk interface glue (information exchange between XCMD and HyperTalk), the complementary and well-documented Pascal and C examples can help programmers of one language learn the other.

There is one glaring omission from this \$24.95 book: a top-notch explanation of the interface format. The reader is asked to copy the XCMD starting format, without being told

what the peculiar interface format is accomplishing. Nonetheless, a substantial technical book on the subject is welcome, and Bond's effort is exemplary.—*Scott Kronick*

New Player in the Shell Game



When Paperback Software's VP-Expert for the Mac makes its debut this fall, it may well change the rules in the AI market much as it did when it first appeared on the IBM PC.

The Mac version includes features not available in combination on competitive shells, even at substantially higher prices. These features include hypertext file structures that automatically generate hypertext links between file entries; one-command creation of interactive graphic elements such as gauges, meters, and output graphs; and a special "demon" rule that monitors expert-system conditions and activates whenever certain factors change.

VP-Expert Mac will probably be priced in the same range as the company's PC version, which sells for \$250. At that price, it would become one of



VP-Expert for the Mac may well change the rules in the Mac AI market.

three Mac shells priced under \$300 and would offer more capabilities than most shells costing over \$500.

Initially, the Mac version won't be compatible with the PC version because the Mac version contains additional features. Plans call for the two products to be almost completely compatible in early 1989.

VP-Expert for the PC is indisputably the largest-selling expert-system shell of all time—thanks largely to its combination of real power and attractive price.

Paperback was founded by computer industry pioneer Adam Osborne, who said he is "gradually and deliberately transforming the company into one that is in the intelligent business applications market." For further information, call Paperback in Berkeley, California, at 415/644-2116.—*Dan Shafer*

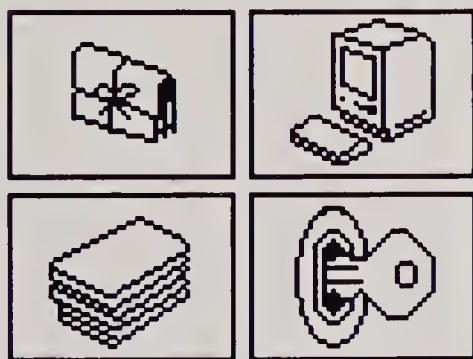
Your Best Stacks



"Your Best Stacks" returns this month with a stack submitted by Bob Davis. The stack is a full-function Home-Card and Finder replacement titled Portfolio, which comes in two versions, one for registered owners and a shareware version that is fully functional except for some inaccessible scripts. Also, in the shareware version a function for launching an application from a scrollable list is disabled; you can launch applications using a launch button, but not from the scrollable list. This button can be exported by Portfolio to any other stack you have. Of the relatively large number of Finder-replacement stacks I have seen, this is the one I would use. It has an extensive list of features, including many Finder options.

The screen design is clear, concise, and uncluttered. All of the buttons are easy to learn and become intuitive rapidly.

Selecting one of the letter buttons at the lower left of the screen sends you to the card that can launch an application, desk accessory, or HyperCard stack. The buttons on the upper right of the screen allow you to perform Finder functions and add and delete buttons from cards. This stack's



Bob Davis's stack, Portfolio, is a full-function Home Card and Finder replacement.

scripts are very well done and are extremely well documented internally; extensive use of comments has made them easy to follow. Learning HyperTalk is much easier if you can find sample scripts to learn from, and these are very good. You

will want to become a registered user for this stack, because a number of scripts are protected in the unregistered shareware version. All in all, Portfolio is clearly worth the download time, and I recommend it highly.

Stackware authors, be sure to send in your best stacks for consideration in this column, and please identify them as commercial, shareware, or public domain. If the shareware version is different from the registered version of your stack, please include a copy of the registered version for evaluation as well. You should also include a text file describing what makes your stack different or unusual. I will post any stack that appears in "Your Best Stacks" to the two BBSs I run so that all of *MacWorld's* readers can download it and try it themselves. My BBS is PCPursuit at 408/253-3926, and my remote board is on Portal at 408/725-0561 or C PORTAL via PCPursuit and Telenet.—*Bob "Laserman" Murrow*

On Guard!

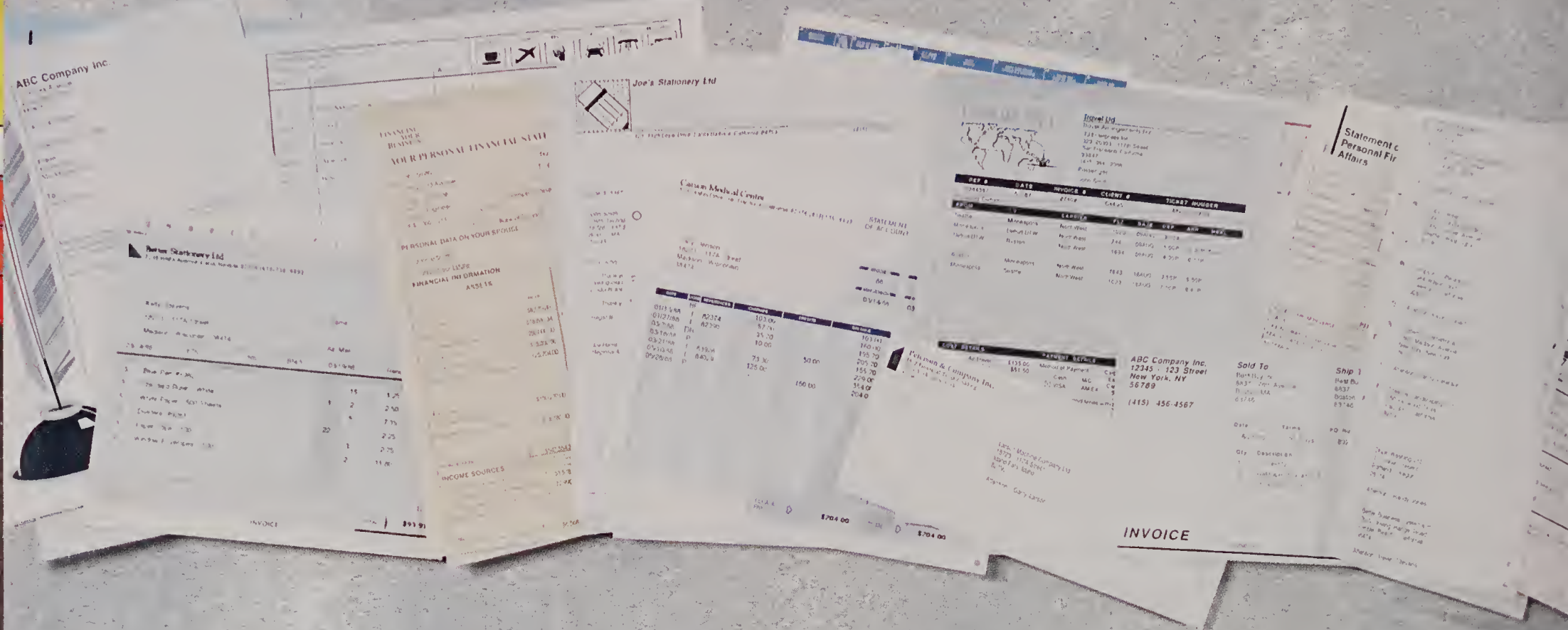


Only 3 viruses are active in the Macintosh community, compared with over 40 in the MS-DOS environment, according to Interpath, an antiviral software

(continues)

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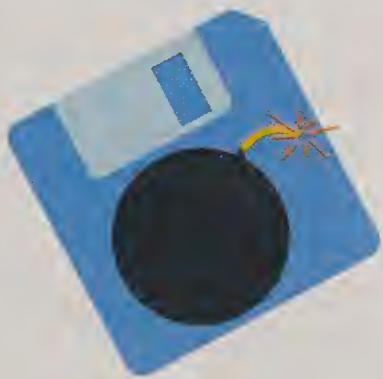


drawing a form

company based in Santa Clara, California. And because MS-DOS antiviral programs tend to be commercially based, they take longer to get to market than the Mac's public domain programs, which are distributed quickly over bulletin boards.

For instance, there are now 6 commercial antiviral programs for MS-DOS computers, while the Mac has the same number of antiviral public domain programs. These programs include: Vaccine, Virus Detective, Agar, Ferret, Interferon, and KillScores. KillScores, which repairs a disk infected with the Scores virus, is distributed on disks for \$2 each within the Dallas/Fort Worth Mac User's Group by Howard Upchurch, a viral investigator and Mac user.

The presence of a virus can be hard for the average user to diagnose, and relatively few Mac users actually experience an infection (only 8 percent, according to a recent *Macworld* reader survey). The best advice for those who are infected, according to Steve Costa of the Berkeley Macintosh User Group (BMUG), is to copy all document files to other media, reformat your hard disk, and start



over with a fresh System and original copies of application software. Document files can then be returned to the hard disk, Costa believes.

Dealers, businesses, developers, and software pirates are most likely to get viruses because they have lots of software going through their equipment. Typically, individual users who aren't connected to networks

Select any Pests that are Visible on the Plant

 A) Actual Size: ♂	 B) Actual Size: ♀	 C) Actual Size: ♂
 D) Actual Size: ♂	 E) Actual Size: ♂	 F) Actual Size: ♂

☐ (A) ☐ (B) ☐ (C) ☐ (D) ☐ (E)
☐ (F)

100%
C
E
R
T
A
I
N
T
Y
0%
100%

OK
Unknown
Stop Info

If you shake your plants, do bugs fly off? What do they look like? Get a diagnosis from Houseplant Clinic, a HyperCard expert-system stack developed with IntelliCard's Intelligent Developer shell.

won't pick up viruses unless they transfer applications or system files.

Users who want protection from viruses, or who want viral detection programs, can order a \$3 diskette (Utility 8) from BMUG, 1442A Walnut St., #62, Berkeley, California 94709.

Apple Plus New AI



With its first official appearance at the American Association for Artificial Intelligence show in Minneapolis last August, Apple demonstrated its hardware and networking solutions in tandem with more than a dozen third-party suppliers of AI-related products and engineering productivity tools.

One of the most noteworthy new high-end products was Gold Hill Computers' Gold Works II for the Macintosh II. Rather than being ported from the PC to the Mac, this expert-system development tool is built on top of a specially engineered version of LISP that was put together for Gold Hill by the Coral Software team.

The result is a \$7500 product that requires no special add-in

board and runs on a Mac II rather than on the more expensive microExplorer platform from Texas Instruments. (Other high-end expert-system development tools—such as Inference Corporation's ART and IntelliCorp's KEE—require the microExplorer, a Mac II with a special add-in board and software that TI markets in conjunction with Apple.)

HyperCard interfaces of one kind or another appeared on several AI products at the show. Hyperpress Publishing's new IntelliCard program, a HyperCard-based delivery vehicle for expert systems built using the company's Intelligent Developer shell, features the ability to extract all of the rules, facts, and graphics from a working Intelligent Developer knowledge base and automatically create a HyperCard stack. The designer can then modify the

stack to provide interactive graphic buttons, external file links, hypertext, and other features.

IntelliCard comes in two versions. Bundled with Intelligent Developer at a total package price of \$395, the program includes all the knowledge-extraction and stack-generating tools needed to build stand-alone, Mac-based applications. As a separate add-in, IntelliCard SQL adds the ability to access SQL databases, such as Oracle, directly from within IntelliCard rules. This means that an expert-system developer can give users a customizable interface while rules and facts are kept out of their reach so that the knowledge is protected from accidental alteration or disclosure.—Dan Shafer

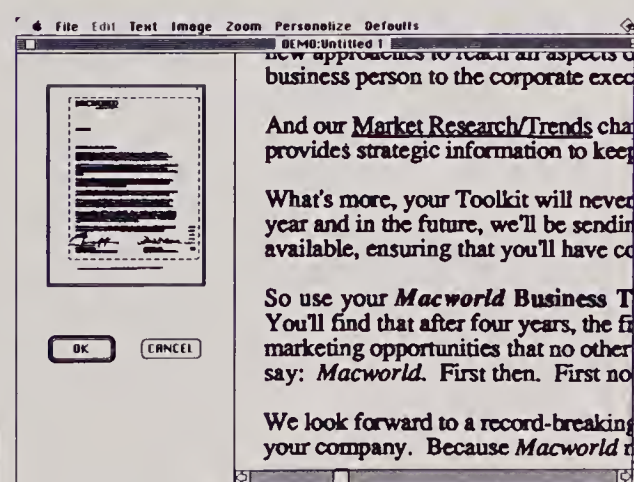
How Do You Spell Relief?



Two new optical character recognition (OCR) software packages may be just what the doctor ordered for those of you who are sick and tired of retyping printed documents into the Macintosh.

OmniPage, from Caere Corporation, recognizes text from scanned pages, even if there's a mix of graphics, images, fonts, and type styles on one page.

(continues)



For those tired of retyping: Caere's OmniPage recognizes text from scanned pages, even if there's a mix of graphics, images, fonts, and type styles on one page.



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You can save text in either ASCII or MacWrite format. In addition, you can merge text into spreadsheets, databases, and forms on the Mac. Listing at \$795, OmniPage comes with built-in drivers for Apple, Hewlett-Packard, and Canon scanners. It can also recognize text from TIFF files produced by other scanners.

Inovatic's ReadStar II is a \$4500 trainable system that can read typed and typeset characters at constant or proportional pitch—kerned characters, italics, boldface, and even foreign languages. You can actually see text-recognition speed up during the training procedure, which is relatively painless. You can save text in ASCII format so it can be imported into other Mac applications. ReadStar II is compatible with Microtek, Hewlett-Packard, Canon, and Ricoh scanners.

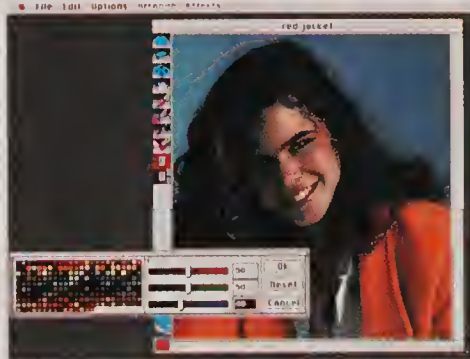
For more information contact Inovatic at 1911 N. Fort Myer Dr., #708, Arlington, VA 22209, 703/522-3053; Caere at 100 Cooper Ct., Los Gatos, CA 95030, 408/395-7000.—*Brita Meng*

Color Images Find Their Avalon



Macintosh desktop publishers no longer have to rely on dedicated prepress production systems to prepare color images and photographs for printing.

PhotoMac for the Mac II, from the Avalon Development Group of Cambridge, Massachusetts, combines 24-bit color image processing with a full range of color prepress capabilities. The result is complete color pages with graphics, images, and text. The \$695 program will be distributed by Data Translation starting in November.



With PhotoMac, designers can retouch images with transparent paint, opaque paint, or colors picked from the image.

Avalon has developed a special color-mapping algorithm that enables users to do full-color 24-bit editing on a Mac II 8-bit color display. PhotoMac also uses a special virtual-memory architecture to handle very large images—up to 32,000 by 32,000 pixels—with just 2 megabytes of memory. The maximum image size and number of image windows that can be simultaneously opened is determined by available disk space, not RAM. At least a 40MB hard disk is recommended for use with PhotoMac.

PhotoMac imports any Mac PICT file, as well as IBM PC Targa and Vista image files. It supports such input devices as 35mm slide scanners, flatbed scanners, and video capture boards. Designers can retouch images by painting and air-brushing in transparent paint, opaque paint, or a color picked directly from the image.

Image manipulations include rotation to any angle, resizing, and flipping. In addition, designers can montage several

images by cutting and pasting between image windows. Special effects convert full-color images to monochrome, and color negatives to positives. The final image can be saved in either PICT2 format or Quark XPress TIFF-24 format, for import into layout applications.

PhotoMac supports three color-correction systems for prepress functions: red-green-blue; cyan-magenta-yellow-black; and luminance-hue-saturation. Users can select any of the three to color-correct all or part of an image. Proofs can be printed on color thermal printers, or separations can be produced on a Linotype 300. For more information, contact Data Translation, 100 Locke Dr., Marlboro, MA 01752, 617/481-3700.

HYPERCARD

HyperCard E-Mail

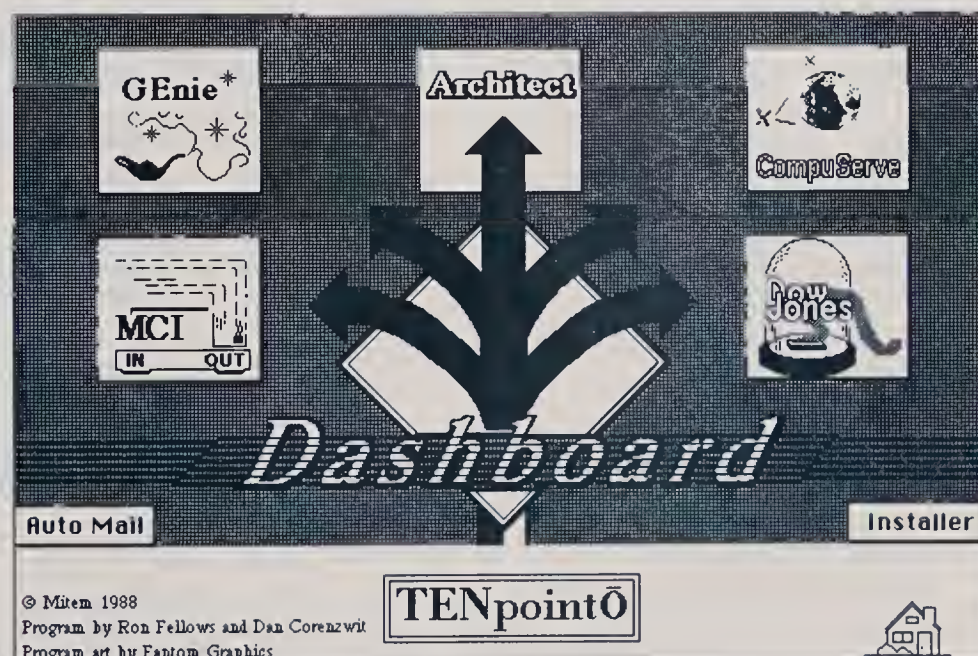


Billed as the next-generation communications program, HyperCard-based Dashboard certainly has a head start in that it uses push buttons to maximize ease of use. And like most HyperCard stacks, it offers a user-customizable graphic interface to

make it look the way a communications program should.

But its ease of use doesn't mean a lack of capabilities. Dashboard lists the status of your electronic mail and lets you send, receive, forward, edit, print, store, or delete mail. Dashboard lets you forward mail to a predefined group of individuals, post and read messages on bulletin boards, access software libraries, join conferences and filter out selected participants, and access current and historical stock quotes for all markets. Other customization features include the ability to automate entire communication sessions and to build interfaces to communication services (many interfaces are supplied with the program).

Dashboard supports two communication sessions in two different windows at the same time, and it emulates VT100 and TTY terminals. It features Xmodem, Ymodem, MacBinary II, Kermit, and CompuServe B protocols, and it lets you store frequently called numbers in an address book. Developed for TenPoint0 (a division of Mediagenic) by Mitel Development, Dashboard is expected to ship by year's end at a list price of \$199. For further information, call TenPoint0 in Menlo Park, California, at 415/329-0800. □



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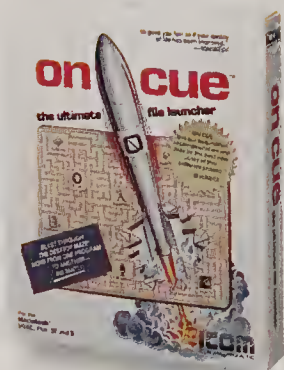
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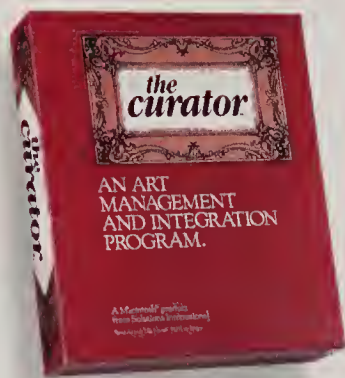
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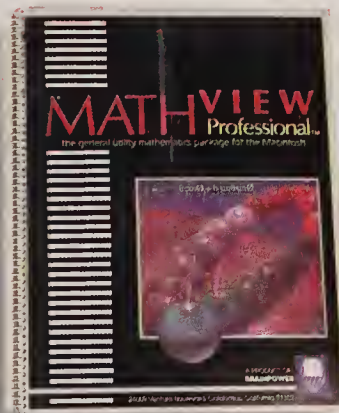
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3637	ClickArt Letters Vol. 1.	28.
3638	ClickArt Letters Vol. 2.	28.
3634	ClickArt Effects.	28.
3633	Christian Images.	35.
3631	Bombay Laser font.	45.
3641	Plymouth Laser font.	45.
3643	Seville Laser font.	45.
3635	EPS Illustrations.	75.
3639	WriteNow 2.0.	109.
TML Systems ... NCP		
3548	Source Code Library II.	42.
3549	TML Pascal II 2.50.	79.
TOPS ... NCP		
4189	TOPS Teleconnector (DB-9).	39.
4188	TOPS Teleconnector (DIN-8).	39.
3726	TOPS for DOS 2.0.	119.
3723	TOPS Mac 2.0.	119.
3724	NetPrint 2.0.	119.
3725	TOPS Repeater.	132.
3720	TOPS Flashcard (90 days).	169.
Traveling Software ... NCP		
3729	LAP-LINK Mac 1.2.	85.
True BASIC ... NCP		
LANGUAGE & TOOLKITS		
3587	True BASIC 2.0.	59.
3570	Advanced String.	49.
3574	Business Graphics.	49.
3579	Mathematicians Toolkit.	49.
3583	Scientific Graphics.	49.
3584	Sorting & Searching.	49.
3588	3D Graphics.	49.
4178	Communications.	49.
EDUCATIONAL SOFTWARE		
3571	Algebra.	35.
3573	Arithmetic.	35.
3575	Calculus.	35.
3577	Discrete Math.	35.
3578	MacFunction.	35.
3580	Pre-Calculus.	35.
3581	Probability.	35.
3586	Trigonometry.	35.
3585	TrueSTAT.	49.
Unicorn ... CP		
3751	Animal Kingdom.	27.
3752	Decimal Dungeon.	27.

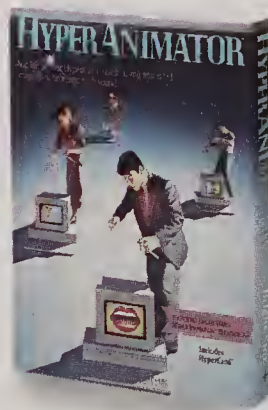


BrainPower ... NCP
MathView Professional—Superb mathematical and computation program. Handles linear and non-linear equations, 2 and 3 dimensional plotting, stats and series operations, etc. **\$145.**

3753	Fraction Action.	\$27.
3755	Mac Robots.	27.
3756	Math Wizard.	27.
3754	Read-A-Rama.	32.
William & Macias ... NCP		
3779	DiskFinder 1.1.	29.
3783	myDiskLabeler w/Color 2.8I.	31.
3784	myDiskLabeler w/LaserWriter option.	34.
WordPerfect ... NCP		
3800	WordPerfect Mac 1.0.	185.
Working Software ... NCP		
3790	Lookup 1.0.	30.
3788	Findswell 2.0.	36.
3792	Spellswell 2.0F.	45.
3789	Spellswell Legal Dictionary.	60.
3791	Spellswell Medical Dictionary.	60.
Zedcor ... NCP		
3985	ZBasic 4.0.	59.
3986	DeskPaint 2.0.	69.

ENTERTAINMENT

Accolade ... CP		
1184	Hardball.	23.



Bright Star Technology ... NCP
HyperAnimator—First to use random access hyperanimation. Use own digitized image, or one of many faces provided, to add a personal interface to your HyperCard stacks. **\$89.**

Avalon Hill ... CP		
1011	MacPro Football.	28.
Blue Chip ... CP		
1441	Millionaire.	35.
Broderbund Software ... CP		
4099	Shufflepuck Cafe (air hockey).	22.
4111	Moebius (color adventure & arcade).	24.
4229	Where in World Carmen San Diego?	25.
1429	Ultima III.	24.
1421	Ancient Art of War.	27.
1428	Toyshop.	30.
Bullseye ... CP		
1544	Ferrari Grand Prix.	32.
4074	P51 Mustang Flight Simulator.	32.
Electronic Arts ... CP		
1844	Dr. J vs. Larry Bird.	15.
1848	Patton vs Rommel.	15.
1847	Ogre.	20.
1851	Scrabble.	26.
1850	Reach for the Stars.	26.
1842	Chessmaster 2000.	28.
4064	Chuck Yeager Flight Simulator.	32.
Epyx ... CP		
2039	Winter Games.	15.



Datadesk ... 2 years
Mac-101 ADB Keyboard—Everyone needs more keys for macros, cursor control and menu shortcuts. This keyboard gives you plenty, plus the better feel of resist and release keys. . . **\$139.**

2037	Sub Battle Simulator.	24.
Greene, Inc. ... CP		
2268	Crystal Quest.	26.
4119	Crystal Quest w/Critter Editor.	42.
Infinity Software ... CP		
2518	GO.	27.
2519	Grand Slam Tennis.	27.
MacroMind ... NCP		
2772	Mazewars+.	31.
MEDIAGENIC ... CP		
1339	Shanghai (Activision).	24.
Microsoft ... CP		
2868	Flight Simulator.	32.
Micro Sports ... NCP		
2787	MSFL Pro League Football.	32.
Miles Computing ... CP		
2764	Down Hill Racer.	24.
2767	Harrier Strike Mission II.	27.
2765	Fool's Errand.	27.
Mindscape ... CP		
4083	Balance of Power 1990.	30.
3987	Colony.	30.
2743	Crossword Magic.	30.
2745	Deja Vu.	30.
2749	Shadowgate.	30.
2750	Trust & Betrayal: Legacy of Siboot.	30.
2751	Uninvited.	30.
PBI Software ... CP		
3110	Strategic Conquest Plus.	35.
PCAI ... NCP		
4212	MacCourses.	32.
3144	MacGolf.	35.
Primera Software ... CP		
3169	Smash Hit Racquetball II.	22.
Psion ... CP		
3132	Psion Chess.	31.
Sierra On-Line ... CP		
4161	Mother Goose.	19.
3397	Leisure Suit Larry.	23.
3394	King's Quest I.	29.
3395	King's Quest II.	29.
3396	King's Quest III.	29.
3399	Space Quest.	29.
3400	Space Quest II.	29.
3398	Police Quest.	29.
Silicon Beach Software ... NCP		
3500	Airborne! (CP).	20.
3505	Enchanted Scepters (CP).	21.



“Did you beam it up or what?”

“Gentlemen:

“I have been pleasantly surprised with your service to date, but what happened the other day totally blew me away. Late in the afternoon I placed an order for various Mac software. When I arrived at my office the next morning at 9 AM, the package was already sitting there.

Did you beam it up or what? I'll just pass the word to everyone that this is the old, I don't know, call it the American way or whatever. Or, as some Brazilian friends of mine once put it, 'That's what we like about America. If you want something, boom, you got it!' Keep up the good work.”

Leo D. Bores, M.D.
Director, Bores Eye Institute
Scottsdale, AZ

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at earthly prices.

3503	Dark Castle.	\$27.
3502	Beyond Dark Castle.	27.
3501	Apache Strike.	27.
Simon & Schuster ... CP		
3303	Star Trek—Kobayashi Alternative.	24.
3304	Promethian Prophecy.	24.
Slr-Tech ... CP		
3347	Mac Wizardry.	35.
Softstream, Inc. ... NCP		
4071	Mac•Man (w/adaptor).	24.
4072	The Solitaire DA.	24.
4073	Colour Billiards.	39.
4078	3 Game Pak.	75.
SPHERE, Inc. ... NCP		
4175	Solitaire Royale (for Mac SE).	20.
4001	Solitaire Royale (for Mac II).	20.
3464	Tetris.	26.
3462	PT-109.	26.
3460	GATO.	26.
3461	Orbitor.	26.
3459	Falcon.	26.
XOR ... NCP		
3816	Pro Challenge.	30.
3815	NFL Challenge.	64.

HARDWARE

Manufacturer's minimum limited warranty period is listed after each company name. Some products in their line may have longer warranty periods.

Abaton ... Lifetime		
1188	ProPoint ADB.	99.
Asher Engineering ... Lifetime		
1212	Turbo Trackball ADB.	69.
AST Research ... 6 months		
1229	Mac 286.	call
1226	AST TurboScan (sheetfeed).	call
1225	AST TurboScan (flatbed).	call
1227	AST TurboLaser PIS.	call
Curtis Manufacturing ... Lifetime		
SURGE SUPPRESSORS		
1715	Safestrip.	21.
1689	Diamond.	32.
1694	Emerald.	36.
1709	Sapphire.	47.
1707	Ruby.	55.

Cutting Edge ... 1 year

3988	CE 105ADB Keyboard.	\$135.
3989	800k Disk Drive.	175.
3990	The Wedge XL 30 + SCSI Drive.	629.
3991	The Wedge XL 45 + SCSI Drive.	829.

Datadesk ... 2 years

1819	MAC-101 Keyboard (beige).	139.
1820	MAC-101 Keyboard (platinum).	139.
1821	MAC-101 Keyboard (ADB).	139.
1818	HyperDialer.	26.

Dove Computer ... 90 days

1801	SCSI Interface/Port.	85.
1807	MacSnap 524E.	289.
1809	MacSnap 524S.	379.
1811	MacSnap 548E.	549.
1812	MacSnap 548S.	599.
1800	MacSnap 2SE.	439.
1797	MacSnap Plus 2.	439.
MAC SE 68020 ACCELERATOR BOARDS		
1793	Model MSE1.	585.
1794	Model MSE2 (1 Meg).	979.
1795	Model MSE3 (math chip).	779.
1796	Model MSE4 (1 Meg/math chip).	1159.



Microlytics ... NCP

Gofor—Where's that letter? Which memo mentioned coffee breaks? Find them fast! *Gofor* quickly searches all your text files for keywords & tells you what's buried where \$45.

4231	Model MSE4x4 (4 Meg/math chip).	2395.
1803	1024 Option.	439.
Ergotron ... 1 year		
2004	Mouse Cleaner 360°.	15.
3992	The Muzzle (platinum).	62.
1998	MacTilt (platinum).	68.
2000	MacTilt SE.	68.
1999	MacTilt Large.	85.
3993	Mac II Workstation Model A.	525.
3994	Mac II Workstation Model B.	535.

Farallon Computing ... 1 year

2202	PhoneNET-AppleTalk 120.	9.
2203	PhoneNET PLUS (DIN-8).	35.
2204	PhoneNET PLUS (DB-9).	35.
2206	PhoneNET StarController.	1319.
2205	PhoneNET Punch Down Block.	69.
2201	TrafficWatch.	159.

FWB Software ... 1 year

3996	PocketHammer40.	call
3997	PocketHammer80.	call
3998	Hammer91.	2195.
3999	Hammer155.	2995.
4000	Hammer300.	4295.

Hayes ... 2 years

2300	Smartcom II 3.0B.	88.
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SuperMac Technologies ... NCP

Acknowledge—A communications construction set. Comes with pre-designed Macintosh-style interfaces for many communications services including CompuServe and GENIE. \$349.

2304	Smartmodem 1200.	299.
2307	Smartmodem 2400.	449.

Kensington ... 1 year

2563	Mouse Pocket ADB.	8.
2577	Mouseway.	8.
2558	ImageWriter II Cover.	9.
2569	Mac Plus or SE Cover.	9.
4126	LaserWriter II Cover.	17.
2562	Mouse Cleaning Kit.	17.
2550	Disk Drive Cleaning Kit.	20.
2580	Mac II Stand.	20.
2545	Universal Copy Stand.	22.
2573	Maccessories Tilt/Swivel.	22.
2578	Extra Long ADB Keyboard Cable.	25.
2556	Maccessories Anti-glare Filter.	33.
2579	Mac II Monitor Cable Extension.	33.
2559	Apple Security System.	34.
2568	Maccessories SuperBase.	34.
2585	Printer Muffler 80.	43.
2586	Printer Muffler 80 Stand.	24.
2583	Printer Muffler 132.	58.
2584	Printer Muffler 132 Stand.	24.
4070	System Saver SE.	52.
2560	MasterPiece 400.	64.
2561	MasterPiece Mac II.	105.
2546	Maccessories A-B Box.	64.
2566	System Saver Mac (platinum).	64.
2547	New Turbo Mouse ADB.	109.

Koala Technologies ... 90 days

2593	MacVision 1.4.	169.
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Kraft Systems ... 1 year

2600	3-Button QuickStick.	39.
4082	3-Button QuickStick ADB.	51.

Kurta ... lifetime

2604	IS ADB Tablet.	259.
2605	Cordless 4 Button Cursor.	99.

Migent ... 1 year

2785	Pocket Modem.	115.
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MSC Technologies ... lifetime

2808	A+ Mouse.	65.
2809	A+ Mouse ADB.	85.

Nutmeg Systems ... 90 days

2992	15" Monitor for Mac Plus.	1295.
2994	15" Monitor for Mac SE.	1295.
2993	15" Monitor for Mac II.	1395.
4002	19" Monitor for Mac Plus.	1395.
4003	19" Monitor for Mac SE.	1395.
4004	19" Monitor for Mac II.	1495.



Software Ventures ... NCP

Microphone II—Powerful scripting & background features make connecting to your information service a snap. MultiFinder compatible. Includes Glue™. \$225.

Call 800-622-5472.

Nuvotech ... 1 year

- 2999 TurboNet/AppleTalk connector cable \$6.
3001 TurboNet ST (DB-9) 24.
3000 TurboNet ST (DIN-8) 30.

Orange Micro ... 1 year

- 3036 Grappler 79.
4076 Grappler LQ 92.

Personal Computer

Peripherals ... 2 years

- 3177 HD-WSI (Apple HD-20 to SCSI) . . . 269.
3181 MacBottom HD 21 SCSI 659.
3180 MacBottom HD 21 w/Modem 779.
3185 MacBottom HD 32 SCSI 699.
3184 MacBottom HD 32 w/Modem 829.
3189 MacBottom HD 45 SCSI 859.
3188 MacBottom HD 45 w/Modem 979.
3190 MacBottom HD 70 SCSI 999.
3176 MacBottom IHD-144 Meg (1 yr.) . . 1495.

Practical Peripherals ... 5 years

- 3100 1200 Baud External Modem 109.
3102 2400 Baud External Modem 189.
3089 Mac Communications Pack 249.

Sharp ... 90 days

- 3453 JX-450 Color Scanner call

Shiva ... 1 year

- 3444 NetSerial X232 309.
3442 NetModem V1200 359.
3443 NetModem V2400 479.

SoftStyle ... 90 days

- 3277 MacEnhancer 159.

Summagraphics ... 90 days

- 3371 MacTablet 12" x 12" 379.

Thunderware ... 90 days

- 3648 ThunderScan 4.0 with PowerPort . 199.
3645 Mac II Power Accessory 42.

DISKS

- 2214 Fuji 3 1/2" DS/DD Disks 18.
3297 Sony 3 1/2" DS/DD Disks 19.
3772 Verbatim 3 1/2" DS/DD Disks 19.
2792 MAXELL 3 1/2" DS/DD Disks 20.

INFORMATION SERVICES

CompuServe

- 1676 CompuServe Information Service . . 24.
1671 Grolier's Online Encyclopedia . . . 32.



Microsoft ... NCP

Excel—The best spreadsheet for the Mac just got better. New features include customized menus & dialog boxes, MultiFinder compatibility, and full color support for the Mac II \$249.

- 1673 CompuServe Navigator 2.02 \$45.
1674 Standard Service/Navigator Bundle 59.

Dow Jones

- 1789 Dow Jones Membership Kit 24.
1785 Desktop Express 95.
1786 Market Manager Plus 189.

ACCESSORIES

Bantam Books

- 1403 Complete HyperCard Handbook . . 24.

Computer Coverup

- 1723 ImageWriter II Cover 8.
1722 ImageWriter LQ Cover 8.
1720 Mac Plus Cover Set 10.
1724 Mac SE Cover Set 10.
1725 Mac SE Ext. Keyboard Cover Set . . 10.

Computer Show Network

- 4113 VIDEO: On Becoming a Desktop
Publisher w/Free Product Demo Video
(VHS ONLY) 39.

Goldstein & Blair

- 2267 The Macintosh Bible 16.



Manx Software ... NCP

Aztec C—Comes with both Aztec shell and the MPW shell so that you can decide what environment is best for the way you program. \$75.

I/O Design

- 2378 MacLuggage HDware 54.
2376 MacLuggage Macinware Plus 64.
2379 MacLuggage Imageware II 49.
2381 MacLuggage Macinware SE 76.

Kalmar Designs

- 2532 Teakwood Roll-top Case (45 disks) . 14.
2531 Teakwood Roll-top Case (90 disks) . 20.
2533 Teakwood Roll-top Case (135 disks) 28.

Microsoft Press

- 4057 Microsoft Works on the Apple Mac 15.
4056 Working with Word 17.
2864 Excel in Business 18.

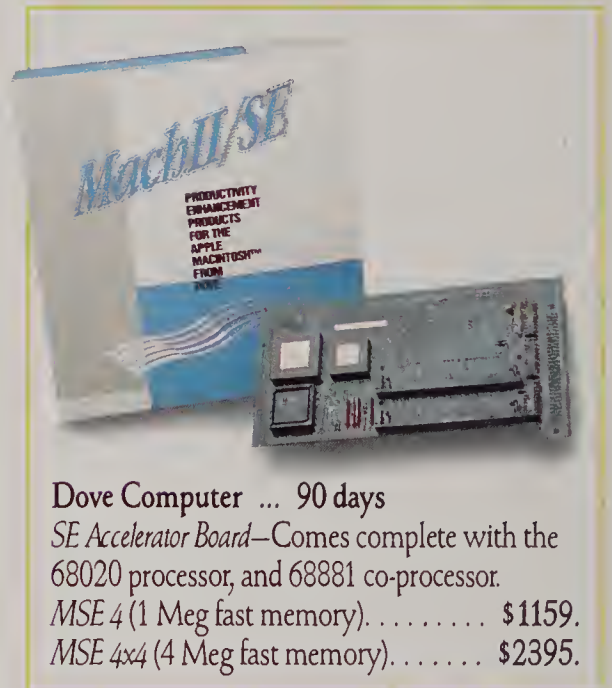
Moustrak

Available in a variety of colors.

- 2694 Moustrak Pad (standard 7"x9") . . . 8.
2692 Moustrak Pad (large 9"x11") 9.
2693 Moustrak Pad L/F (9"x11") 10.
Moustrak Designer Series (Features
selected photos from the book, "A Day
in the Life of America.") each 12.

Ribbons

- 3255 ImageWriter II Black Ribbon 4.
3261 ImageWriter II 4-color Ribbon 9.
3270 ImageWriter II Rainbow Six Pack . . 20.



Dove Computer ... 90 days

SE Accelerator Board—Comes complete with the 68020 processor, and 68881 co-processor.
MSE 4 (1 Meg fast memory) \$1159.
MSE 4x4 (4 Meg fast memory) \$2395.

Available in black, blue, brown, orange, green, purple, red, yellow, silver & gold.

- 3260 ImageWriter LQ Black Ribbon 17.
4011 ImageWriter LQ 4-color Ribbon . . . 20.

Sopris Softworks

- 4163 The Gallery (folding disk holder) . . 20.
4017 ImageWriter II Cover 11.
4016 Mac Plus Cover 15.
4019 Mac SE & Ext. Keyboard Cover . . . 15.
4018 LaserWriter II Cover 17.
4012 High Trek ImageWriter II carry case. 49.
4013 High Trek Mac Plus carry case . . . 59.
4014 High Trek Mac SE & ext. kybd. case 69.

Targus

- 3618 ImageWriter II Carry Case 49.
3617 Mac Plus/SE Carry Case 59.
4015 Mac SE & Ext. Kybd. Carry Case . . 69.

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Mad Macs

*The scoop on Macintosh viruses:
their history, identification, and eradication*

by Suzanne Stefanac

It used to be power surges.

Then it was MultiFinder and System 6.0. Now, when the Mac crashes or balks, we blame it on a virus. No matter how bomb-tolerant we become, we always feel better if we can point a finger at some culprit.

The truth is, computer viruses are responsible for few of our daily fiascos. The hype and resultant mystique/paranoia that have grown up around these tiny bits of code would lead us to believe that pressing two disks together can spread a virus, and that the sneakier varieties can deduce your mother's maiden name. Unraveling the web of misinformation and urban mythology reveals that Mac viruses are neither common nor malicious. They do pose a threat, however, in that they undermine the climate of trust and openness that has flourished in the Mac community.

As of this writing, there are three main families of viruses plaguing Mac users. This article chronicles the history and implications of each and includes guidelines for avoiding them. Understanding a few basic facts about these electronic hazards is the first step in halting their spread.

There is no need for alarm. The symptoms most often associated with the existing Mac viruses—printing and access problems (with drawing and spreadsheet programs, in particular) and system crashes when opening applications—have generally been the result of coincidences and incompatibilities between the viral code and the code of the system or application. Although all three kinds of electronic free-loaders attach themselves to system files or applications, none have been shown to target data files. You can easily eradicate a virus by replacing the System Folder and infected applications with clean copies from the original master disks. This, of course, presents a problem for software pirates.

Some consider viruses benign, but individuals who have lost hours and patience getting rid of the little devils probably wouldn't agree. No matter how

well-intentioned or talented the virus-writers may be, they are creating uninvited interlopers. No matter how thoroughly the virus code is tested and researched, no programmer can reliably predict how the virus will interact with the myriad programs and configurations that are out there.

Of Trojan Horses, Worms, and Viruses

Many Macintosh users recall, with varying degrees of bitterness, last year's Sexy Ladies stack. Unlucky viewers discovered that while they were scanning cheesy images, a snippet of code busied itself erasing sectors on their hard disks. This was not a virus. It was a *Trojan horse*.

Trojan horses appear to be legitimate programs, but they have hidden agendas. They can put up messages, bomb programs, or erase information. Some shuffle data around or slip it out software trapdoors. Harmful as Trojan horses have proven to be, particularly in the mainframe and IBM worlds, they do not reproduce themselves and they cannot contaminate other programs. The damage is localized, and deleting the offending program usually solves the problem.

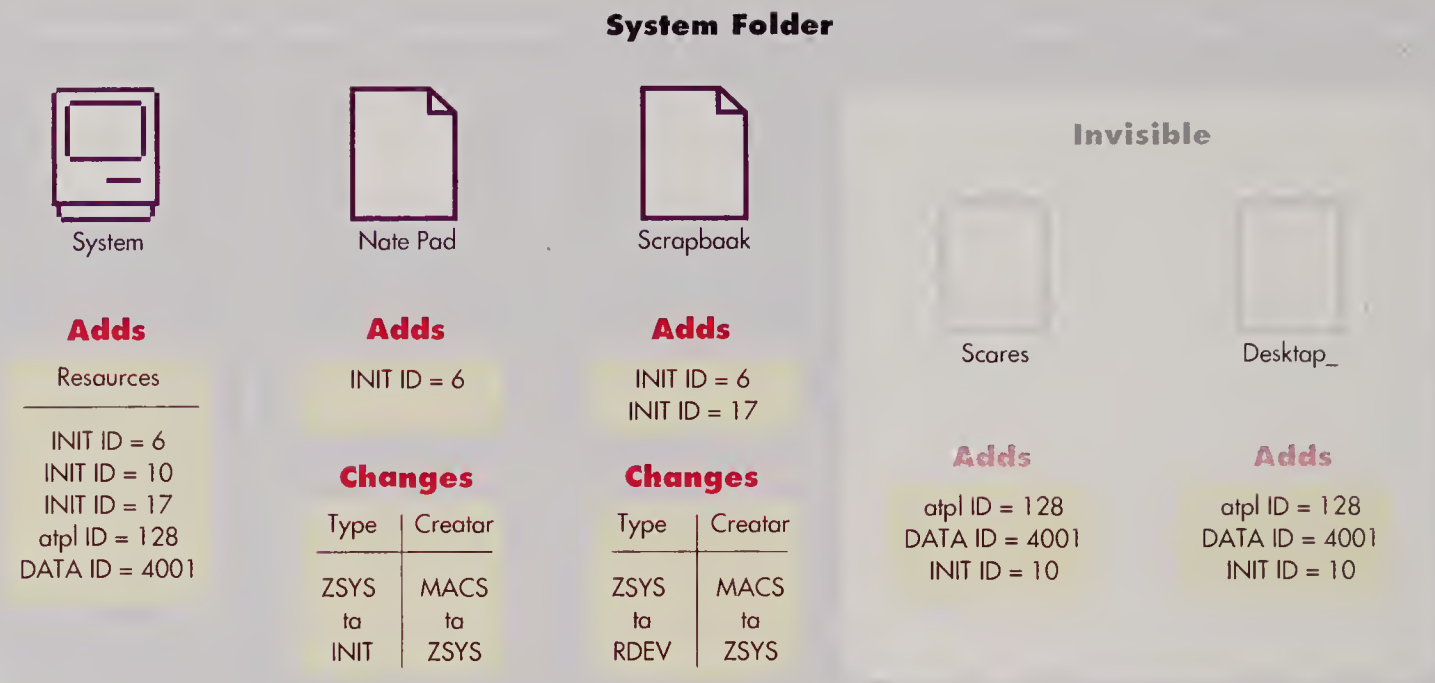
Mac users haven't had to worry much about *worms*—electronic intruders that tunnel their way through memory like moles munching through a carrot patch—but the Apple II community has some horror stories to tell of paralyzed programs and tied-up systems. (These should not be confused with WORMs—write-once, read-many optical disks.)

And then there are viruses. Computer viruses are programmed with two objectives. One is to replicate. To do this, a virus copies itself into a valid program. When you open an infected application in a sterile system, the virus invades the system files. From that vantage point, the virus seeks out other uninfected appli-

How the Scores Virus Invades a System

Day One

An application infected with Scores is modified to run the virus's installation code before running the application code. When the application is launched, the virus checks the System file to see if it is already infected. If it is not, the virus adds the following files and resources to the System Folder:



The Scores virus is actually composed of three INITs (ID = 6, ID = 10, and ID = 17), one atpl (ID = 128), and one DATA (ID = -4001) resource, each copied into several system files.

Note Pad and Scrapbook Files

- The virus creates both files if they don't already exist.
- Icons change from small Macs to generic dog-eared pages.
- Both files function normally.

Scores and Desktop Files

The virus creates invisible Scores (type RDEV) and Desktop_ (type INIT) files. Note that the space (the underscore character here stands for a space) allows this file to coexist with the valid Desktop file.

How the Scores Virus Attacks Applications

Day Two

The Scores virus lies dormant in a newly infected system for two calendar days. Then, during start-up, the INITs installed by the virus load into RAM, where they begin executing their routines.

At three-and-one-half-minute intervals, the virus goes in search of sterile applications, sometimes interfering with routines such as printing. If the virus finds an uninfected application, it installs a 7026-byte CODE resource into the application's second free resource slot. This new resource contains a copy of the viral code, and it adds 7K to an infected application's size.

The virus then inserts code into the jump table of the application's CODE ID = 0 resource. Applications normally jump to the next code segment from the 11th word of the resource. This is where the virus installs code that tells the application to jump to the newly installed viral resource (see "Resource Slots").

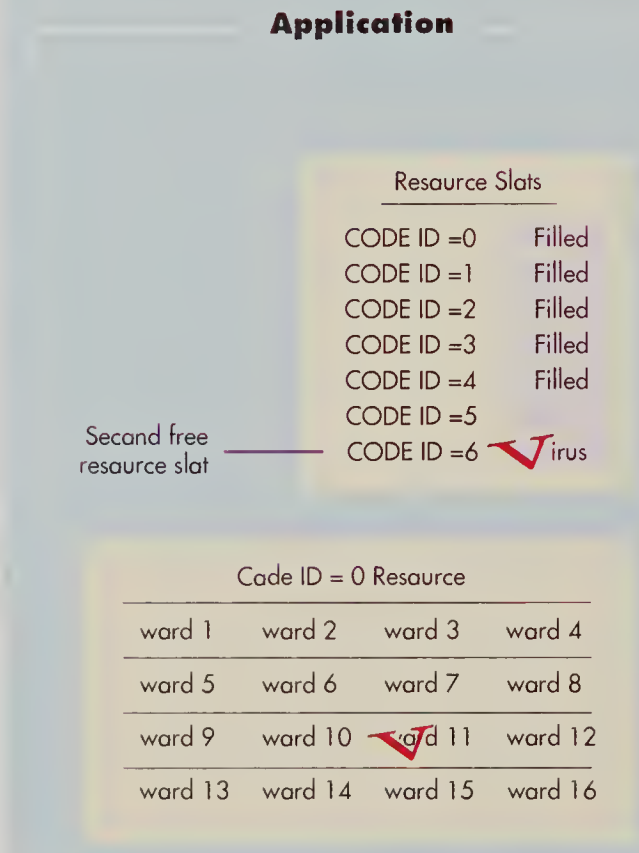
After executing its code, the virus returns control of the Mac to the application.

Day Four

Four days after initial infection, the virus begins looking for programs with the identifiers ERIC and VULT. The virus does not install itself on these target programs. When someone opens one of these applications, the virus lets it run for 25 minutes and then bombs the program.

Day Seven

On the seventh day, the virus waits 15 minutes after someone launches a VULT program, and then the virus forces the program to crash whenever the VULT program attempts to write to disk. And so the virus spreads, from infected application to sterile system, from system to applications, from one Mac to another.



cations; inserting viral code into their resource forks. And the cycle repeats itself. (See “How the Scores Virus Invades a System” and “How the Scores Virus Attacks Applications” for more details.)

The second function is determined by the person who creates the virus. One virus might put up a message, another might bomb specific programs, while others might erase sectors on a hard disk or rewrite a segment of code until it fills a volume's memory.

Peace de Résistance

Only a truly committed misanthrope would admit to being against world harmony, but the “Universal Message of Peace” that found its way onto thousands of Mac screens on March 2, 1988, the first anniversary of the Mac II's introduction, raised a lot of hackles. Neither Richard Brandow, the Montreal editor of *Macmag* who commissioned the virus, nor Arizona programmer Drew Davidson, who wrote the virus, were reticent about taking credit for their part in its inception. Brandow splashed his name across the virus message and Davidson left his in the code. Neither admits, however, to uploading to bulletin boards the New Products from Apple stack that contained a fuzzy picture of the as yet unreleased Apple scanner and the seed copy of the Macmag virus last December.

Brandow contends that the Macmag virus was an innocuous vehicle for informing the Macintosh community about viruses. “The Association Canadienne de Développement Didacticiel (a Canadian software developers' organization) gave us an award back in March, 1988,” says Brandow. “They felt that because of the Macmag virus, people were less inclined to pirate software.”

Not everyone was as enthusiastic. After a few thousand early copies of a demonstration program distributed with Aldus's FreeHand became infected with the Macmag virus, Aldus spokesperson Laury Bryant said, “We feel that Richard Brandow's actions deserve to be condemned by every member of the Macintosh community.” The media downplayed viruses prior to the *Macmag* story. On February 15, 1988, for instance, the *Washington Post*'s T. R. Reid wrote in his “Personal Computing” column, “. . . the first key point to recognize about the computer virus reports—they don't involve personal computers.”

Ironically, the day before, the Hearst News Service had distributed an article that bore the headline, “‘Artistic Virus’ Insinuates Itself into Mac World.” According to the story, there was fear within the Mac community that the Macmag virus would cause “widespread destruction.” The article went on to describe Brandow as an adherent of the Church of the SubGenius. SubGenii were identified as an “ill-defined group of sometime pranksters.” When asked about his connection with the Church, Brandow said, “I am not a member of the Church of the SubGenius, but I do subscribe to *Neoism*, a philosophy of perpetual change, total freedom, and absolute truth; and these principles did play a part in inspiring the virus.”

The Macmag virus entered systems via an infected application, installing itself in the start-up System file as an INIT. The virus was not meant to be noticed until March 2, 1988, when the message would appear and the virus would delete itself. Although several accounts report that hundreds of thousands of users were infected with the Macmag virus, gauging how widely the virus actually dispersed itself is difficult. If you didn't turn on your Mac on March 2 you didn't see the message; and because the virus subsequently deleted itself, you can't tell if you were infected.

Despite the fact that the virus was quite discreet—Davidson is proud of its 1.7K size—its presence was exposed before the target date and the response of many users, particularly those on bulletin boards, was quite bitter.

“I ended up looking like the guy in the black hat,” admits Davidson. “The main reason I wrote this is that I wanted to be the first. I don't want them to continue. The problem is, once something becomes this sensational, there are a lot of copycats.”

Copycats

Viruses are not a new phenomenon in Europe. A little over a year ago, some source code examples of viruses were posted on West German electronic bulletin boards by a programmer who had been victimized by



DRAKE SORFY

Fear of Viruses

Heidi Roizen, president of T/Maker Software and of the Software Publishers Association, feels that the real problem with viruses is the fear they inspire in the Macintosh community.

Viral Antidotes

Detecting and eradicating the current Mac viruses is not that difficult. Although it is possible to have a virus in your system for months without major symptoms or serious harm, the sooner you spot one and get rid of it, the fewer other applications and systems you'll infect.

Symptoms

Most symptoms peculiar to known Mac viruses are not, alas, all that peculiar. System crashes, excessive access times, printing glitches, and odd noises can usually be traced to causes other than viruses. If your system is more erratic than usual, however, or if you regularly add new software to your collection, it makes sense to check for viral infection.

Detection of nVIR and Scores Viruses

Several virus-detection programs (see "Antiviral Chart") are designed to look for the known viruses. Most are posted on the major bulletin boards as freeware or shareware, and Virus Rx is available from authorized Apple dealers. Virus Rx, VirusDetective, VirusCheck, and Interferon look for evidence of both the Scores and nVIR viruses. Ferret and KillScores are specific to Scores. The default settings in RezSearch program it to look for the nVIR viruses.

One quick way to check for the Scores virus is to open the System Folder. If the small Mac icons for the Scrapbook and Note Pad files have been replaced by generic dog-eared page icons, the System is almost certainly infected.

Run one of the detection programs from a locked floppy and check all systems and/or applications that are on your hard disks and floppies. Virus

Rx is a good one. Read its report carefully. It lists every INIT, CDEV, RDEV, and invisible file on a disk. These will generally be normal. If Virus Rx labels any files "Dangerous", "Fatal", or "Altered", however, skip to the Eradication section of this page.

If the detection program finds no virus, install Vaccine, a free antiviral CDEV written by Don Brown of CE Software, in all System Folders. Whenever a program attempts to install or modify significant resources (for example, CODE, INIT, CDEV, RDEV, nVIR), Vaccine puts up a dialog box. If you are using Font D/A Mover or installing a new program that alters these resources, you can click on the Granted button when the warning comes up, or you can turn Vaccine off temporarily. Should the dialog box come up at any other time, click the Denied button and immediately run a virus-detection program.

Vaccine is an excellent alert program, but a few caveats are in order:

- Be sure to run a detection program before installing Vaccine. If a System is already infected when you install it, Vaccine won't put up warning dialogs, although it might cause the system to crash or hang up.
- You must open Vaccine from the Control Panel (click on the icon to bring up a window) to make sure the Turn Protection On box is checked, and you must reboot after installing Vaccine before it can begin working.
- Expert and MPW modes are available, but these options should only be used by those familiar with the ways resources are installed.
- Users combining Vaccine with System 6.0 report prob-

lems ranging from crashes to destructive changes made to INITs and CDEVs.

- Not wishing to engage in a spiraling contest with virus writers, the writers of Vaccine will not update it to detect any future viruses.

Eradication of the nVIR and Scores Viruses

Once you've determined that your disks are infected, you must purge the virus from them. Although Apple's resource editor, ResEdit, can be used to identify viral resources and invisible files, it should not be used to clear the viral code. The Scores virus, for instance, changes its resource identifiers if you try to delete the individual resource, and they reassert themselves the next time you start up.

KillScores and Ferret are programmed to remove the resources and two invisible files that distinguish the Scores virus from systems and applications. VirusDetective removes nVIR and Scores resources. Use these with caution. Some applications fail to function properly after a viral code has been removed, and traces of a virus can sometimes remain in System Folder files.

The following routine is a sure way to rid volumes of viruses:

1. Back up your data files.
2. Erase the infected disk.
3. Check master disks with a detection program.
4. Restore system files and applications from original master disks.
5. Restore your data files.
6. Run a detection program again to make sure no viral traces remain.
7. Check any other disks you've used recently.

earlier viruses. He published the code hoping that others would write defenses against viruses. The signature of these demo-viruses was nVIR.

In September, 1988, for instance, it was revealed that members of Hamburg's Computer Chaos Club had infiltrated NASA's Space Physics Analysis Network. Although members of the club adamantly denied adding or altering information in the files, the arrest of the club's virus expert in March of 1988 gave rise to fears that viruses might already have been planted, or that members of the club might release viruses as revenge for their leader's arrest. The University of Hamburg, for instance, responded by forming a Virus Epidemic Center to detect viruses and to produce antiviral programs.

As of this writing, researchers such as Kevin Kelly of the *Whole Earth Review* and David Spector, the senior systems programmer for the New York University School of Business, have identified almost a dozen variations of the nVIR and Macmag viruses. In Spector's words, "The real problem with posting the source code for the nVIR virus—and the Macmag virus was just as bad, really—is that it provides templates for other [virus developers]." The spread of nVIR appears to have been contained, and none of the nVIR viruses that have escaped into the community have been terribly destructive. The most common variety inserts code that sometimes causes an application to beep when you open it. Ironically, if you have MacinTalk installed, instead of a beep you'll hear the words, "don't panic." Because early versions of MacinTalk may be incompatible with the Mac II, it is possible that when the virus tries to voice the message, the Mac II will bomb.

According to Wade Blomgren of University of California, San Diego, Academic Computing, nearly 50 Macs at the University became infected with the virus. In an attempt to stem the proliferation of nVIR outbreaks, Blomgren wrote a detection program called RezSearch. An associate, Mike Scanlin, published Vaccination, a program that inoculates applications against the virus. According to Scanlin, "Once your System file is infected, every application launched from that System will become infected. The whole infection process only takes a second or two, so there is little chance you would notice it." (See "Antiviral Chart" for products that can detect the presence of nVIR viruses.)

Evening the Score

The Scores virus, named for an invisible file that the virus creates in the System Folder, has been the most troublesome for Mac users. Programmers at NASA headquarters in Washington, D.C., were among the first to spot Scores. Senior Computer Systems Scientist Dave Lavery noted that about 20 percent of NASA's 120 Macintoshes began exhibiting difficulty in running MacDraw, in printing from any application (especially MacDraw), and in using the Set Startup option. They also had difficulty running Excel, Excel files became corrupted, and applications crashed frequently when starting up. After spotting some unfamil-

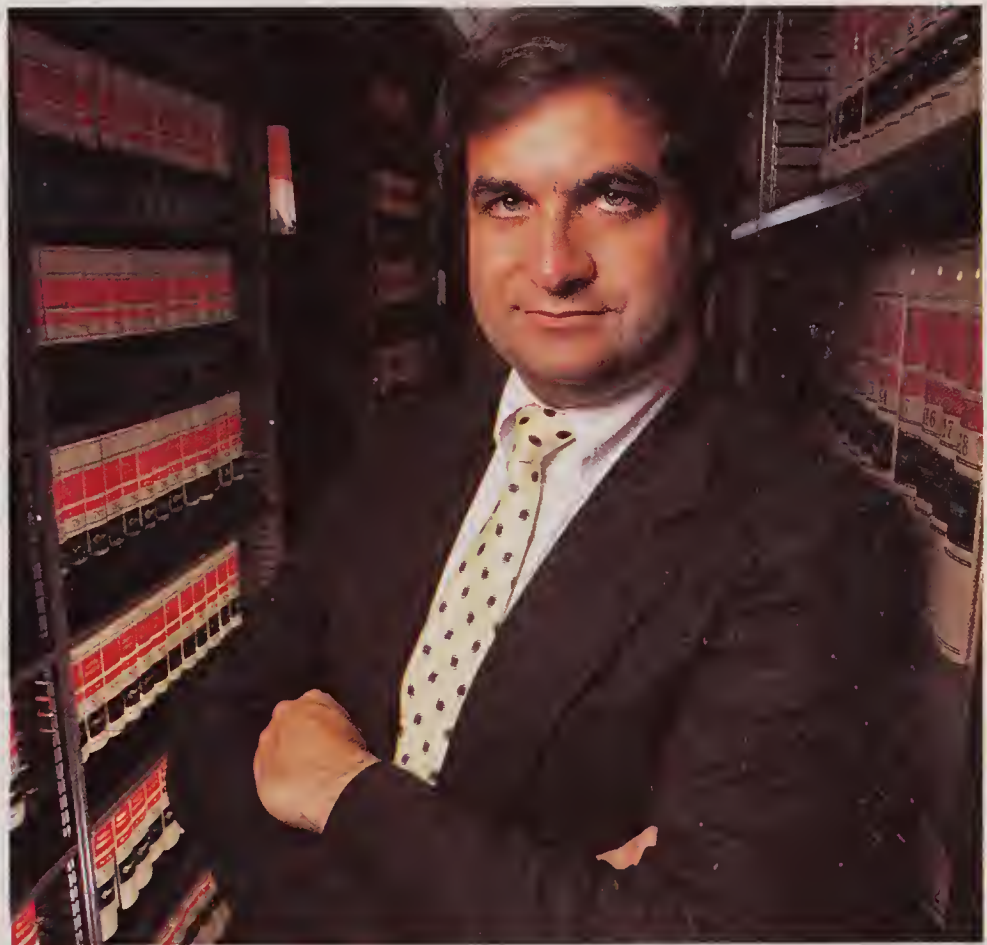
iar resources, Lavery contacted Apple. Investigators spent two days solving the problem.

Lavery assumes that the virus entered NASA via a program downloaded from a bulletin board. "Large businesses and government, in particular, really need to have someone watching over software configuration," says Lavery. Now, all software is double-checked before it is opened on NASA Macintoshes.

Lavery uploaded a fairly extensive report about the virus to bulletin boards, and in early April 1988, Howard Upchurch of the Mac Pack and Apple Corps of Dallas posted the Lavery article, with an addendum, and then published an even more comprehensive article of his own. Infected as early as November of 1987, Upchurch had spent months keeping detailed notes on the virus's behavior and effects. Although he admits to blaming most of his early troubles with the virus on MultiFinder, Upchurch's research and persistence provided a body of information that proved quite helpful to many in uncovering the mechanics and history of the virus. (See "How the Scores Virus Invades a System" for a discussion of how the virus spreads.)

Who Is ERIC VULT?

Virus experts agree that the author of the Scores virus had a mission. Besides containing code ensuring that it replicates, Scores targets two proprietary programs developed at EDS (Electronic Data Systems), a



Legal Remedies

Cary Hickman, attorney for the Software Development Council, says there are legal remedies against virus writers. "The goal is to simplify the process," he notes, "to get new laws on the books that address the problem specifically."

Antiviral Chart

Program	Author	Type	Size in Bytes	Cost	Comments
Agar	Bill Krimmel Aba Software	APPL	361	Free	Acts as electronic petrie dish. Install on disks that contain applications or system files. Check occasionally to see if anything has attached itself to it. Check against screen dump of entire program done in ResEdit.
CRC 1.0	Raymond Lau	APPL	4034	Free	Calculates CRC (Cyclic Redundancy Checks) of Data and Resource forks in decimal form and bytes and times calculation. Can check for changes in files.
Ferret 1.1	Larry Nedry	APPL	16,242	Free	Detects and removes Scores virus; repairs applications. Notifies if file is infected and gives option to cancel, skip, or repair. Offers delete buttons for INIT or RDEV resources for Scores and Desktop_ files. Shows probable date of infection. Points out damaged applications.
Interferon 3.0	Robert Woodhead Vision Fund 10 Spruce Lane Ithaca, NY 14850	APPL	25,585	Donations to Vision Fund	Detects Scores and nVIR viruses and watches for attempts to add code to a common system file, changing the type to INIT. Deletes applications infected with Scores and nVIR viruses. Warns if it encounters VULT or ERIC. Option to report anomalies. HFS only.
KillScores	Howard Upchurch, et al. Mac Pack/Apple Corps of Dallas	APPL	26,806	Free	Detects and removes Scores virus; repairs applications. Repairs System, Finder, MultiFinder, Scrapbook, and Note Pad. Removes phony Desktop_ files. Repairs most damaged applications. Turn Vaccine off before running. Select disk or folder to be disinfected.
RezSearch	Wade Blomgren U.C. San Diego Academic Computing	APPL	26,653	Free	Detects Scores and nVIR viruses. Specifies resource type, ID number, and size for search. Looks for nVIR by default. Can find nonviral resources. Verbose mode lets you see each file name and directory name as program examines them. Can save results to file. Incompatible with MultiFinder. HFS only.
Shield	Symantec Corporation 10201 Torre Avenue Cupertino, CA 95014	INIT	21,411	\$99.95	Monitors disk directory on start-up disk. If operation is attempted that would damage directory by setting data to zeros, Shield brings the action to a stop and informs you of attempt. HFS only. (Shield is part of Symantec Utilities for Macintosh.)
Vaccination	Mike Scanlin	APPL	3117	Free	Innoculates applications against Scores virus. Immunizes applications against the nVIR virus. System file must be immunized manually using ResEdit.
Vaccine	Don Brown CE Software	CDEV	11,875	Free	Warns when it encounters Scores and nVIR viruses. Warns when something attempts to modify certain significant resources. User can grant or deny permission (for example, allowing changes to resources when installing programs or using Font/DA Mover). Expert mode displays small icons in upper right. MPW mode, also. Put in System Folder and reboot.
Virus Rx	Apple Computer	APPL	41,229	Free	Detects Scores and nVIR viruses. Lists files as "Dangerous", "Fatal", or "Altered" if it finds suspicious resources or files. You must replace these files. Lists damaged applications, all INIT, CDEV, and RDEV files, as well as invisible files. Provides good safeguarding information in documentation.
VirusCheck	Albert Lunde Northwestern University Academic Computing	APPL	53,366	Free	Detects Scores and nVIR viruses. Checks active System Folder, boot blocks, and all applications for changes by comparing OldSystemChecksum with new output file. Checksum of applications less detailed than for contents of System Folder. Distributed in compiled and source code. HFS only.
VirusDetective	Jeffrey S. Schulman P.O. Box 50 Ridgefield, CT 06877	DFIL	22,879	\$10 Shareware	Detects and removes applications infected by Scores virus. Desk accessory. Can search for resources by size or range of sizes, name, or ID. Add these resources to the default settings: atpl ID = 128, DATA ID = -4001, INIT ID = 17, and INIT ID = 6. You must clear invisible Scores and Desktop_ files with ResEdit.

Antiviral Chart

Macintosh programmers were quick to develop and post free or very reasonable shareware antiviral products. Similar programs in the IBM realm cost between \$80 and \$200. Because it's possible that viral code can attach itself to any program, including an antiviral program, check the size of your copy of an antiviral against the size listed in the chart.

company that provides computer and communications services to major corporations and government agencies. Founded by H. Ross Perot and now owned by General Motors, EDS maintains worldwide data networks and employs more than 48,000 individuals.

According to EDS sources, some time after one programmer was fired, an anonymous disk containing a copy of the Scores virus showed up at EDS's Dallas office. Soon afterward, Macintosh users at EDS reportedly began to experience slowness, random crashes, and printing problems, as well as systematic crashes with in-house programs containing the identifiers ERIC and VULT.

Scores was apparently written to target two of EDS's in-house programs that bear the ERIC and VULT identifiers. Although Scores does cause the target programs to crash (see "How the Scores Virus Attacks Applications"), the author of the virus seems to have designed it more to vex than to destroy information. Because its mission is so specific, it appears that the program's escape into the population at large was unintentional.

Many Macintosh users would like to see the creator of Scores in court. EDS spokesperson Roger Still says, "A civil suit is not appropriate in this case. . . . Besides, the outbreak was so contained—a couple of dozen Macs—and we feel it was dealt with quite thoroughly. We followed every possible lead, but that case is now in the past for us."

Other victims are not so quick to dismiss the case. The virus has reportedly invaded the United States Environmental Protection Agency, the National Oceanic and Atmospheric Administration, and the United States Sentencing Commission. Sources indicate that Apple has been working with law enforcement agencies since the outbreak of the Scores virus, and in early July 1988, NASA reportedly called on the FBI to investigate.

"I believe that whoever wrote this," says NASA's Lavery, "could not foresee enough of the potential system configurations to prevent an occasional collision between the virus and other active applications and printer drivers. Some people think that it has run its course," he concludes, "but I don't think we've seen the last of it."

There Ought to Be a Law

There are no laws that deal specifically with computer viruses, but several state legislatures have recently passed laws that prohibit unauthorized access to computers. On January 1, 1988, California enacted section 502 of the Penal Code. It declares that anyone

who "knowingly accesses and without permission adds, alters, damages, deletes, or destroys any data, computer software, or computer programs which reside or exist internal or external to a computer, computer system or computer network . . ." is guilty of a public offense. Individuals accused of authoring and/or knowingly distributing a virus in California could potentially face \$10,000 fines, loss of computer equipment, and three years in jail.

The Software Development Council (SDC), a coalition of six regional trade organizations, recently formed a combined developer/legal task force to combat software viruses. SDS's spokesperson Cary Hickman, an attorney who specializes in high-tech law, points out, "In civil suits, damage calculation is tricky but not insurmountable. Calculations would include loss of memory and time, pain and suffering, and the intentional infliction of emotional distress. The goal is to simplify the process, to get legislatures to address the problem."

"The problem," he continues, "is that most lawmakers are just not trained in the technology. To make laws work, they need tinkering like a car. Ultimately, the point is to make the creation of viruses impermissible. Unequivocally. Even in the name of fun. The fact that a Canadian software developers' organization gave Brandow an award for his virus is an appalling thought. What he did was no better than breaking into a house and leaving a note that says he could have ripped the owner off."



MAX AGUILERA HELIWEIG

Macmag Author

Programmer Drew Davidson, who wrote the Macmag virus, doesn't want to be grouped with the author of the Scores virus.

Tips for Keeping Your Mac Virus-Free

- Run virus checks before backing up.
- Back up, back up, back up. And archive more than just the most recent backup. Imagine discovering that not only is your system infected, but so are your backups.
- Never work with original master disks. Write-protect them (snap open the lock tab on the floppy) and make copies. Use the copies to install and run programs. This precaution can't be emphasized enough. If you don't have uninfected original disks, you aren't going to be able to replace applications that pick up a virus.
- Make a backup copy of your uninfected System Folder. All the customization that you've added—INITs, CDEVS, fonts, desk accessories—are in danger of being lost if you have to throw away infected system files.
- Network users with access to shared applications should observe the same precautions as individual users: verify that the current system and applications are virus-free. Test all new programs. Better yet, use the server for accessing data files only and avoid running server-based applications.
- Quarantine infected systems.

Disconnect them from networks and don't move files from them until the virus is completely eradicated.

■ Keep unfamiliar software on floppy disks until its quality is determined. The major bulletin boards have been quick to diagnose and eradicate any problems in their files. Still, it is in your best interest to be suspicious of all new downloaded software.

■ If you're exchanging software with other users, be suspicious of all new programs.

■ Don't be in a hurry to put new software on a hard disk. Run it from a floppy with the hard disk turned off. Some viruses contain time bombs and their effects may not show up right away.

■ The Shield INIT in Symantec Utilities for Macintosh (SUM) offers a unique protection. It will not allow any information on the start-up disk to be erased. This is a safeguard that could be extremely valuable should any future viruses emulate those in the mainframe and IBM worlds that attempt to erase data information.

Testing Unknown Software

1. Boot the Mac from a floppy start-up disk.

2. Unmount any internal hard disk by dragging its icon to the trash.

3. Record the sizes of the System and related files by using the Finder's Get Info command. The size of the System shouldn't change unless you add or remove fonts, desk accessories, or other resources. Record the size of a familiar application.

4. Put the unknown software and the familiar application of known size on a floppy and run the new software with a copy of the System that you checked in the previous step. (A program like Agar, designed to provide an electronic medium for growing viruses, can also be placed in the System Folder.)

5. Using the Control Panel, update the Mac's date setting and run the program several times on the new dates. Some viruses are time bombs that lie dormant for a predetermined length of time.

6. Check the size of the application, the System, and/or Agar against their previously recorded size. Unaffected applications should not, as a rule, grow any larger in size.

7. Run the familiar application and note any unusual behavior.

T/Maker's Heidi Roizen is the president of the Software Publishers Association. She's concerned that "the more stringent you make the laws, the more likely it is that criminals will work to get around the laws." She believes that issuing procedures for developing and duplicating software, along with educating users, is the answer.

The first virus case before the courts is being tried at the time of this writing. Donald Gene Burleson faces a charge of "harmful access to a computer" in Fort Worth, Texas. Burleson is accused of planting a virus that deleted 168,000 records of employee sales commissions. This is the first test of a three-year-old

Texas computer sabotage law. Its outcome is expected to set a precedent for potential cases in other states.

As Ash Jain of the Irvine Resource Group aptly notes, not all Mac users are equally susceptible to viral attack. "A single user at home who doesn't, as a rule, trade software, is generally quite safe," says Jain. Someone who works in a network environment is in an entirely different position. When you add bulletin board access to the formula, you have an even more complex and vulnerable situation."

Although incidences of the Scores virus seem to have peaked in late spring of '88, isolated outbreaks

Glossary

atpl Usually an Appletalk driver device.

CDEV Code for Control Panel device.

Creator code A four-letter code that identifies the application that created a file (for example, MPNT for MacPaint and XCEL for Excel).

Data fork Usually contains information generated by the user of a program.

Desktop file An invisible data file created by the Finder to keep track of files, folders, icons, and so forth.

INIT Files placed in the System folder. INIT resources found in INIT, RDEV, and CDEV files are loaded into RAM at start-up and are executed first.

RDEV files Device drivers in the System Folder.

Resource fork Generally contains an application's program code, as well as information on fonts, formatting, menus, icons, and so forth.

Type code Sometimes called a file's signature; a four-letter code that identifies what kind of information a file contains (for example, APPL for an application and TEXT for text-only data).

ResEdit A resource editor distributed by Apple.

are still reported regularly. Until these outbreaks stop, users need to take precautions whenever adding software to their collection. (See "Tips for Keeping Your Mac Virus-Free.")

Safe or Sorry

Electronic bulletin board systems (BBSs) have been unfairly blamed for the lion's share of viral infections. It's true that the accessibility and diversity of files on BBSs make them obvious targets for viral-terrorists, but it is to the credit of the major BBS operators that they have been quick to diagnose and eradicate any viruses in their files.

CompuServe, for instance, added associate sysops (system operators) to monitor all information uploaded onto its boards. MacNet sysop Pat O'Connor reports, "I run one of the larger BBSs, and I have never seen a virus." Steve Costa of BMUG says that its system has never been infected and that few users attending their meetings have reported virus attacks. Costa says that only 1 out of 20 users who call BMUG to report a virus actually has one.

One unfortunate consequence of virus hysteria is that innocent people find themselves branded. Raymond Lau, author of the popular StuffIt compaction program, found himself defending the integrity of his program when version 1.2 picked up a virus. The rumors grew until finally a British newspaper reported that the Mac community was heavily infected with the "StuffIt Virus." The infected StuffIt problem appears to have been somewhat localized in Texas, and the program has been clean since Lau began uploading version 1.40A of StuffIt in May 1988.

Software developers have also had to beef up security. Because viruses interfere with the development of new software, and because fear of infection can undermine public trust in a company's products, software developers are doubly vulnerable. A source at one major company noted that after an outbreak of the Scores virus, "everything just started crashing." The company quickly instituted stringent testing routines, quarantining of unknown software, mandatory classes on viruses for all employees, and archival backups. There have been no further outbreaks, and no infected software ever shipped.

Forewarned is Forearmed

Laws provide one kind of solution to the virus problem, but the real answers lie in the development of hardware and software safeguards and in the willingness of users to be more cautious. We will have to sacrifice some degree of freedom to security, but most of the precautions recommended for avoiding viruses are healthy habits to cultivate anyway. The big three rules to remember are:

- back up regularly and keep archival backups;
- write-protect disks whenever practical; and
- don't panic. □

See *Where to Buy* for contact information.

How to Buy a Macintosh

by Barbara J. Chan and Gordon Haig

In which our consultants tell you what to buy and what it'll cost you

So you want to buy a Macintosh. Great—which one? And how much memory will it take to do your job? Which printer is appropriate? What kind of storage device will you require, and what other equipment do you need?

Back when the Mac was a closed box, putting together a system was easy. Today, matching your available funds against your requirements, and your requirements against the available hardware options, can start to make you feel as if you're personally in charge of balancing the federal deficit.

But at least you're not on your own. To help you find your way through the Macintosh decision maze, we've devised the accompanying questionnaire (see "Macintosh Needs Analysis"). Once you've filled out the form and figured out exactly what you expect from a personal computer, the rest of this article will help you to decide which hardware and software configurations match your personal computer profile.

Different Macs for Different Hacks

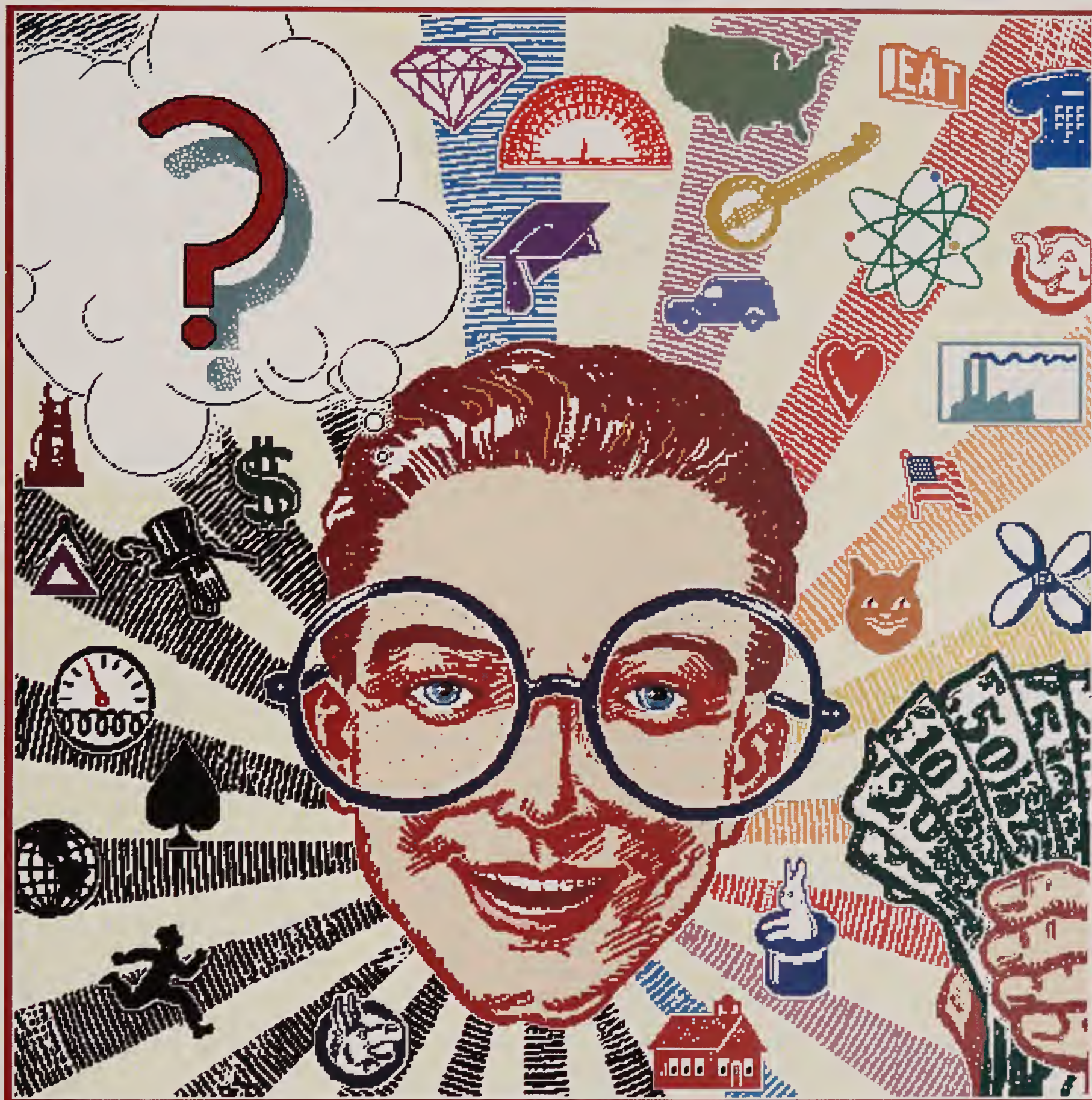
The Macintosh Plus is the no muss, no fuss model for people who want a tool they can use without becoming mechanics. It's easy to set up and use, takes little desk space, and is transportable. Like all members of the Macintosh family, it comes with

an 800K internal floppy disk drive, 1 megabyte (MB) of memory, and ports for connecting hard disks, modems, and network cables. The Plus has no expansion slots for adding new capabilities, but you can expand the RAM (random-access memory—see below) from 1MB to 4MB. The Plus has no fan, which means it's quiet, but also somewhat less reliable.

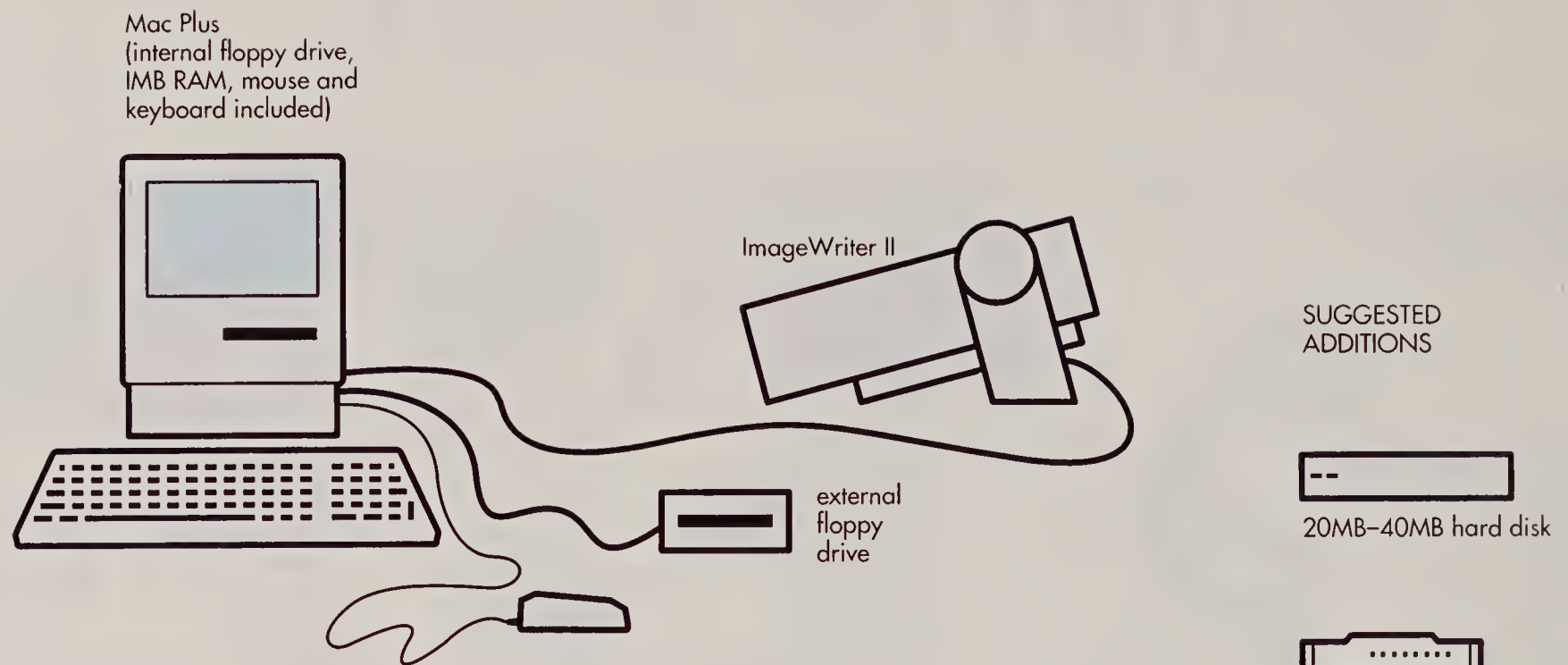
The Macintosh SE is a workhorse; it can do everything the Plus can, 15 to 20 percent faster. It combines the Plus's transportability and small footprint with heavier construction, and it has one expansion slot so it can grow with your needs. An expansion card (which fits into the slot) provides your machine with programming and processing power to do such things as run MS-DOS applications, tie into mainframes or networks, drive a large screen, or simply speed everything up.

The SE comes in two models: one has two 800K floppy disk drives; the other has one disk drive and an internal hard disk. In comparison with the Mac Plus, which can accommodate only two input devices (usually the mouse and the keyboard), the SE's Apple Desktop Bus (ADB) port can accom-

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JOHN CRAIG



Mac Plus: Basic Setup

A good place to start. The Mac Plus is a capable machine with a lot of advantages—if you have the right type of application. If you shop around, you can get started with a system like this for approximately \$1810; list prices total \$2800, not including software.

moderate multiple devices, such as digitizing tablets or joysticks, which you daisy-chain together. An 80-watt power supply and an internal fan enable the SE to support this hardware and in general make the SE suitable for heavy use. Because it can take 90- to 220-volt input, the Macintosh SE can be used in any country.

The SE is better suited to business than the Plus because it provides greater speed and durability. The SE is a better long-term investment because you can modify the basic computer and update it as Apple releases new standards. However, as a result of Apple's recent price hikes the SE now costs an eye-opening \$1300 more than a Plus. You might be better off buying a Plus now and selling it when you want to upgrade to a Macintosh II.

The Macintosh II is fundamentally different from its smaller cousins. Because of the difference, some older applications written for the Plus and SE don't work on

the II, and there are some very sophisticated applications that run only on the more powerful machine. The II's speed and the built-in mathematics coprocessor make it great for spreadsheets and databases, and it's four times faster than the Plus.

While the original Macintosh was conceived as a self-sufficient unit, the Mac II was designed to be a platform upon which to build a system. You start with the central processing unit (CPU—the main box), then select a keyboard and a color or black-and-white monitor. The Mac II has six slots for expansion cards, so you can use special networking, video, and data-acquisition devices. The Mac II also has more powerful sound capabilities and can play back in stereo. It can hold up to 8MB of memory without going to an expansion card and works with very large internal or external hard disks.

What can a II do? A Macintosh II research system might include an instrumentation interface card that connects the Mac

to lab equipment, a real-time data acquisition card to read sensor data, and a 19-inch color monitor to display temperature variations.

All this power doesn't come cheap. The Macintosh II CPU, without a monitor, keyboard, or hard disk, lists for \$1100 more than an SE with a 20MB internal hard disk.

Hard Disks

A hard disk is a permanent storage device, a super filing cabinet that enables a computer to file and fetch documents and saves you from having to search through a pile of floppy disks. After a printer, most people's first peripheral purchase should be a hard disk.

Since it gives you quick access to all of your documents and programs, a hard disk speeds up virtually every job. It is essential for some programs: PageMaker 3.0, for instance, can't run on floppy disks. Hyper-



Macintosh Needs Analysis

Before you plunge into the heady world of Macintosh, we recommend that you answer the following questions to determine your personal-computer profile. The main article will help you to interpret your answers. When you start shopping actively, take your completed questionnaire with you and show it to dealers.

1. First things first:

What do you plan to do with your Macintosh?
What tasks do you want it to perform?

What do you expect to be doing with it in two years?

How much do you want to spend for the whole system, including hardware and software?

2. Software:

What kind of software applications will help you accomplish the tasks you have in mind? For each application you're considering, answer the next three questions.

Is the software compatible with all Macintoshes or only with some?

Will it work reasonably quickly on a Plus? Or do you need an SE or a Mac II?

Is the software available now? Does it work with the current version of Apple's System software?

3. Hardware:

What kind of technology upgrade path do you need? Will you adopt new hardware standards as Apple releases them?

Are you willing to invest more money for extra speed, power, and an upgrade path?

Do you want to customize your computer? Do you need hardware for special functions not provided as part of the standard Macintosh, such as an MS-DOS coprocessor or an Ethernet network card?

4. Output:

Do you need your Mac for high-quality text or graphics? Color? Multipart forms? What page sizes?

Will you frequently need to change paper size or to print letterhead stationery?

Do you need low- or high-volume printing?

Do you want to use the printer with more than one computer?

5. Disk storage:

What do you need to do with your Mac?

A) Word processing; routine spreadsheet calculations; data entry; online searching or other telecommunications; games; occasional use of painting and drawing programs.

B) Use and store sound, graphics, publication or database documents; store and use HyperCard stacks with images and sound; manage large files of any type; use MultiFinder; keep more than one application and related files available for use most of the time.

C) Do you plan to do several of the tasks in B, or set up a file server?

If you answered A, a 20- to 30-megabyte hard disk, or even floppy disks, may suit your needs. If B, buy a larger hard disk (40MB to 80MB). If you answered yes to C, an 80MB to 160MB hard disk will be necessary.

6. Memory:

What is the minimum memory specified by the publisher for your selected application program or programs? How much memory is required for optimum operation?

To find out how much memory a specific set of programs and MultiFinder need, add up the memory as follows (you can find out the suggested memory for any program by selecting Get Info while running under MultiFinder):

System and Finder	450K to 550K
Suggested memory for first application	_____ K
Suggested memory for second application	_____ K
Suggested memory for other applications	_____ K
Background programs or custom control panel devices such as print spoolers or electronic mail	_____ K
Total	_____ K

7. Monitors:

Will you be dealing primarily with text and numbers?

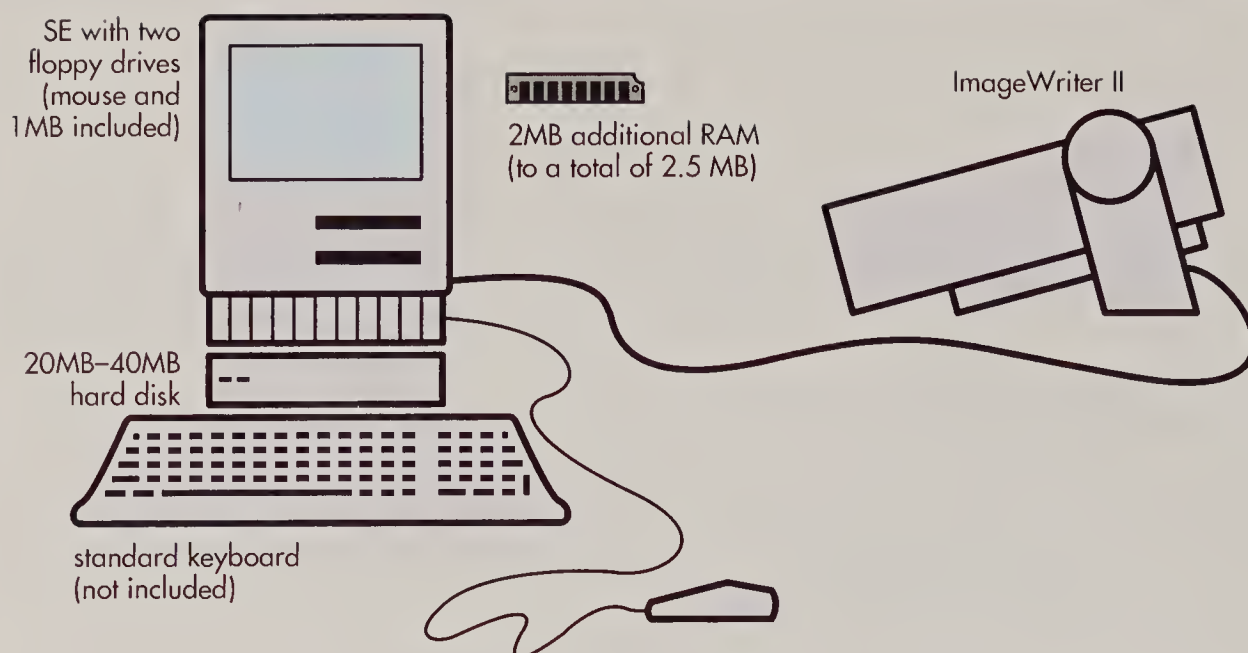
Do you need to do full-page design or layout? Do you want to be able to look at several windows simultaneously in an application? To be able to look at many cells of a worksheet without having to scroll around the window?

Do you want or need color?

Do you want to display and manipulate digitized images, and see them as they will be printed?

8. Networking:

Do you want to connect two or more computers and printers together?



SE: Basic Setup

For the office or home-office. In a multi-Mac office setting, you would probably substitute a LaserWriter for the ImageWriter II. Without the suggested additions, this basic, competent workstation costs \$3650 to \$5000.

SUGGESTED ADDITIONS



2MB additional RAM (to a total 4MB)



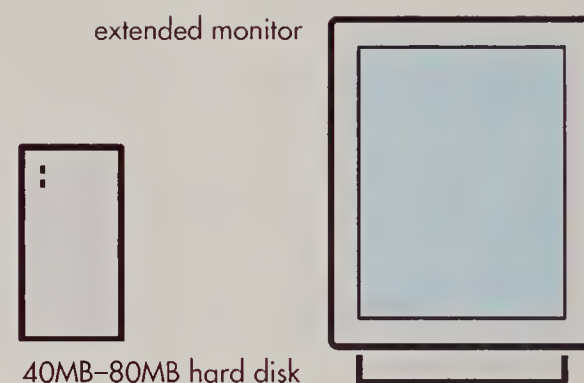
2400-baud modem



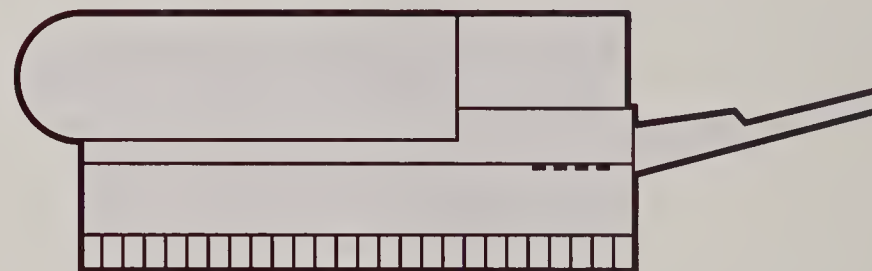
accelerator card



extended keyboard



40MB-80MB hard disk



LaserWriter II SC

Card, MultiFinder, Helix, FullWrite, and 4th Dimension are impractical. If the program and the System files won't fit on one floppy disk, you'll be frustrated trying to use the program on floppies. So unless your needs are modest (all you want to do is write reports or work simple spreadsheets), buy a hard disk—and buy one bigger than you think you need. Like any filing cabinet, your electronic one will fill up much sooner than you expect.

If you're buying an SE or a II you may be tempted to get an internal hard disk, which is slightly cheaper and will make your entire system more transportable. A

Macintosh with an external hard disk is a more reliable system, however. If an internal hard disk breaks down, your whole system will be unusable for as long as it takes to repair the hard disk. If an external hard disk breaks down, you can unplug it and still use your Mac. Another advantage is that external drives are portable from one Mac to another. If a Macintosh is available at your destination, you can carry your applications and data on the hard disk, connect to the computer, and start running immediately.

But what if you can't afford a hard disk? Whether you can survive without one depends on your user profile. If you are

unfamiliar with computers, a Plus with an inexpensive third-party external floppy disk drive might be your best investment. Used with programs such as Microsoft Works, FileMaker 4, or WriteNow, this setup will stretch your own capabilities for some time to come. However, if you are planning to write a dissertation, run a business with large customer databases, or do desktop publishing, you might as well start with the hard disk.

Many third-party vendors sell hard drives for the Macintosh; these products vary considerably in price, speed, and features. Even if your budget is limited, you

Profile: Lisa, Graphic Designer

Lisa has been a free-lance designer for several years. She has a variety of clients, including some who use computers. She knows that using a Macintosh would let her work more effectively with computer-based clients and save her time and money by combining some tasks that she now does mechanically.

She will use the Macintosh to create black-and-white and color line art; prepare presentations and final designs for illustrations, logos, brochures, and annual reports; and send files electronically to a typesetting and graphics service bureau. She would like to see color on the screen and be able to create four-color separations for artwork. To manage her business better, she will computerize cli-

ent information, billing, and bookkeeping. She is prepared to spend up to \$10,000 on software and equipment.

In addition to spending about \$2000 in graphics and other software, we recommended that Lisa start with a transportable black-and-white system (Macintosh SE), large hard disk, and LaserWriter IINT (\$8000). As profits allow, she could add a two-page monochrome display (\$1700). When she wants to upgrade her system she can sell the SE, buy a Macintosh II with 5MB of RAM (\$6100), and connect the monochrome display and other hardware to the Mac II. With a second video card, she can use both color (\$1200, including card) and monochrome monitors on the Mac II.



ROBERT CARDIN

should be able to find a hard disk to suit your needs (see next month's issue for an overview of 20MB hard disks—a good size for a first disk).

Memory

If disk space is like paper and a hard disk like a filing cabinet, then RAM is like the memory inside your head. Just as reading puts notes into your head, so reading from the disk puts data into RAM, where the Mac's "brain" can use it.

When the SE and the Mac II were introduced almost two years ago, 1 megabyte was the standard amount of RAM for the three cousins. Commonly used applications run on 1MB or less, although a few applications may run slowly or limit document size. For word processing, spreadsheets, or midlevel databases such as FileMaker 4 or RecordHolderPlus, as well as for home, educational, or entertainment software, 1MB should be enough.

Relational databases, desktop publishing and graphics programs, and programs that manipulate digitized pictures and sound create large document files. If you're working professionally in one of these areas, extra memory will speed up operations, ensure that you have enough memory for desk accessories and print spoolers, and let you open multiple documents simultaneously.

Apple's MultiFinder enables you to switch quickly between applications. For example, if a customer calls while you are word processing, you can switch to your database, consult his record, talk to him, and switch back without closing down your word processor. MultiFinder won't run practically on a 1MB system; see "Macintosh Needs Analysis" for guidance on how much memory is required.

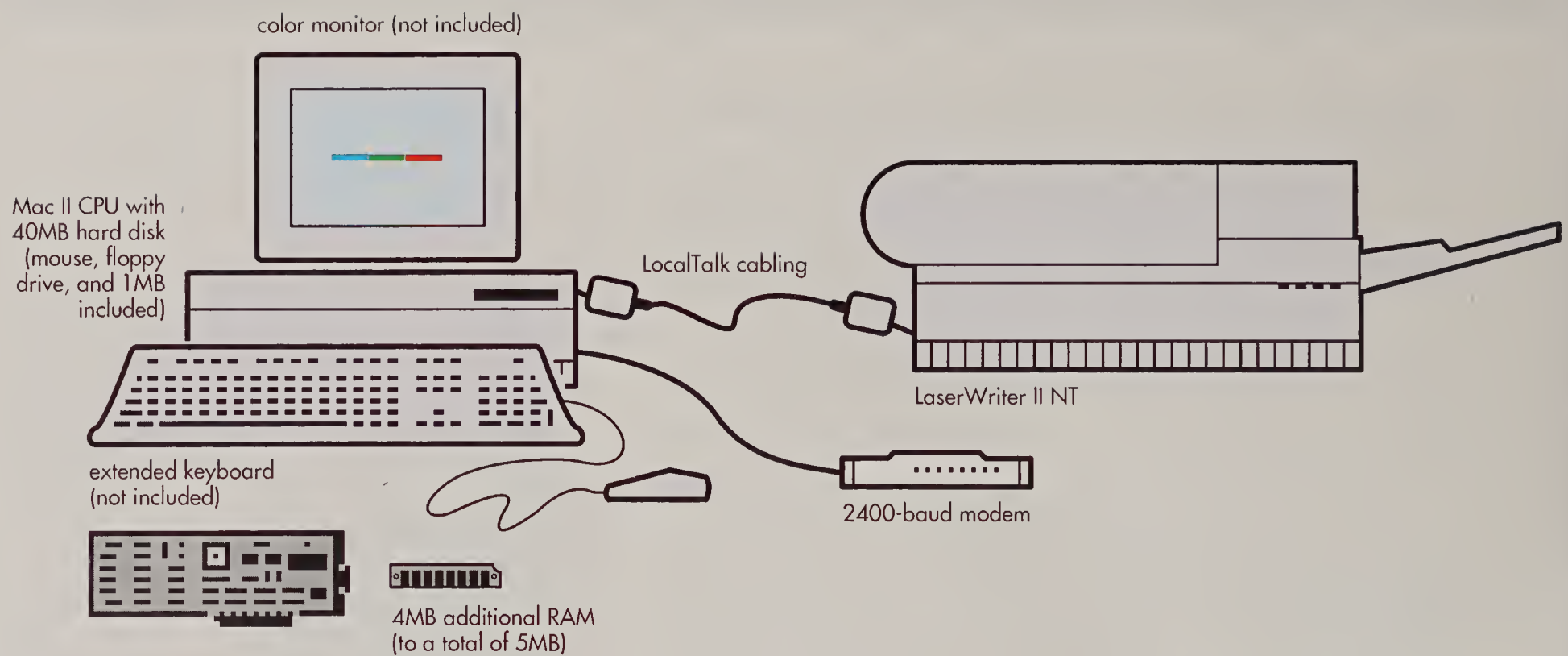
Add-in RAM comes in two forms: as 1MB SIMMs and as 256K SIMMs (SIMM stands for Single Inline Memory Module, for what that's worth). These modules are

essentially miniature boards with chips on them. Prices of 1MB SIMMs have been volatile this year, fluctuating between \$225 per megabyte to well over \$450. As in the stock market, when prices are high, hold off; when they go down, buy. If you need a total of 2 megabytes but no more, you'll save money by buying an upgrade kit that uses four 256K SIMMs. Several vendors offer such kits at prices from \$300 to \$400.

Using the special capabilities of the Macintosh II requires more memory. For example, to run the Interleaf publishing system you need 5MB of RAM. As a general rule, programs that use color or manipulate digitized images need at least 2MB, and do better with 4MB.

Monitors

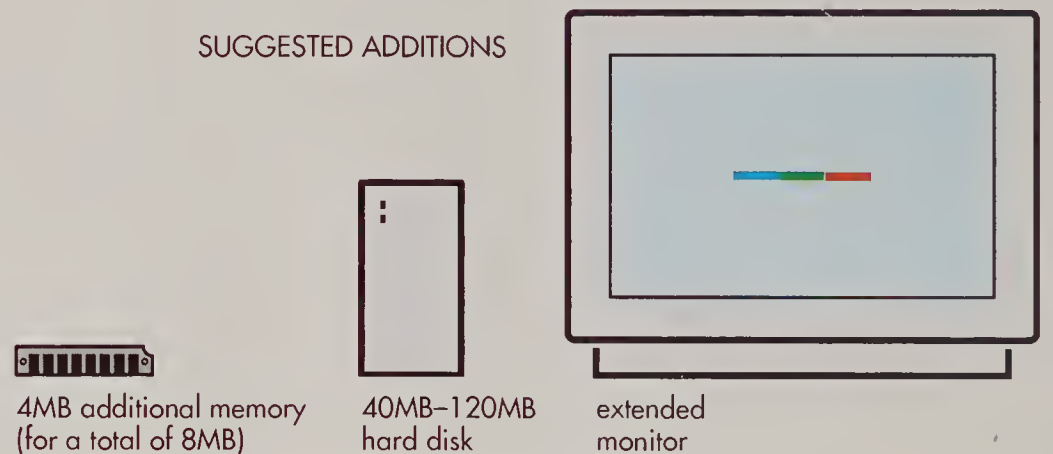
A large-screen monitor enables you to look at several open documents simultaneously and see more of each one. It



Mac II: Basic Setup

For the advanced Mac professional. You can create all kinds of exotic configurations for a Mac II; this setup presents only the most typical workstation choices. Without the additions, this basic setup will run you \$10,525 to \$14,600.

SUGGESTED ADDITIONS



speeds and improves the interaction between you and the computer. For professional desktop publishing, graphic arts, or drafting, a full-page monitor will soon pay for itself. A writer or analyst can use the larger working area to keep a spreadsheet visible while writing a report based on it. In many situations a large monitor might be more valuable than an expensive printer.

There are three kinds of monitors: monochrome, gray-scale, and color. All come in portrait (tall) or landscape (wide) models. A monochrome monitor displays only black and white *pixels* (the screen dots that make up an image). A gray-scale monitor can display different shades of

gray directly, just like a television set. These monitors, whose images look more like photographs, are ideal for desktop publishing. Color monitors display images in living color; the number of colors depends upon the expansion kit and video adaptor used to connect the monitor to the Mac II.

Big screens aren't cheap; they're for people who make their living with a Macintosh. Most SE and Plus buyers can use the built-in screen for word processing, data entry, telecommunications, or any task where they work in only one or two windows at a time. Besides the expense, some big screens take memory and processing time from the program you're using, which slows your Macintosh. If you need a big screen, be sure your Mac is powerful enough to support it.

Printers

Almost everyone needs a printer. Two varieties are the most common: dot matrix and laser. The high-resolution output that people associate with the Mac is printed on PostScript-based laser printers like Apple's LaserWriters.

PostScript printers can access hundreds of professional-looking fonts created using Adobe's PostScript page-description language. When used with a Macintosh and PostScript software applications, PostScript printers give users a high level of control and flexibility in manipulating text and graphics. They're ideal for printing page proofs before typesetting final camera-ready copy at high resolution.

A PostScript laser printer is a must for anyone in the graphics or publishing field. Resolutions from 300 to 600 dots per inch

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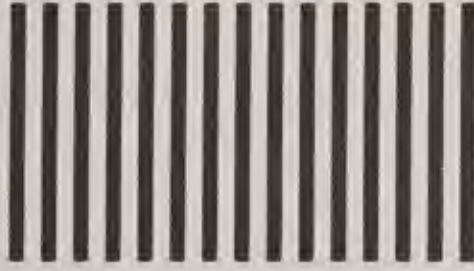
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MACWORLD

The Macintosh® Magazine

Profile: Dave, Consulting Engineer

Dave owns a structural engineering firm. He employs two engineers, a secretary, and a bookkeeper. He wants to computerize all operations, but his budget dictates that he purchase equipment over a two-year period. Some members of his staff have used computers before.

Dave wants to save, modify, and reuse drawings; share information and documents; access records easily; prepare more attractive documents; and have his staff work together more efficiently. Specific tasks include word processing and document preparation, preparing client presentations, computer-aided design, project management, and small-business accounting.

For a two-year hardware purchase plan, we suggested the following:

Phase I: Computerize engineering and some office work

	Unit price	No. Units
Macintosh SE; 45MB–80MB hard disk; extended keyboard (for staff)	\$3900	1
Macintosh II with 5MB; 80MB–140MB hard disk; regular keyboard (for Dave and one engineer)	\$7700	2
Monochrome monitor with video card	\$750	1
Color monitor with video card	\$1200	1
ImageWriter LQ with AppleTalk	\$1300	1
LocalTalk nodes and TOPS software for networking	\$250	3
Multipin color plotter	\$4000	1
Total cost	\$27,300	

Phase II: Give each employee a computer

Macintosh SE; 45MB–80MB hard disk; extended keyboard (for staff)	\$3900	1
Macintosh II with 5MB; 80MB–140MB hard disk; regular keyboard (for engineer)	\$7700	1
Color monitor with video card	\$1200	1
LocalTalk nodes and TOPS software for networking	\$250	2
LaserWriter IINT	\$4250	1
Total cost	\$17,550	

(dpi) are available from several manufacturers, and prices range from \$3500 to \$10,000, with Apple's LaserWriter II series in the middle range. Economically, one thing in PostScript printers' favor is that they all come with the ability to work on a network, so many users can share one print station.

QuickDraw-based laser printers, such as Apple's LaserWriter IISC or General Computer Corporation's Personal Laser-Printer, give you 300-dpi output but have limitations. They don't provide the specialized capabilities of PostScript; without modification, they can't be used with more than one Mac; and because more of the print processing is done by the Mac, this type of printer uses more disk space and memory, requires a hard disk for font storage, and takes longer to print. On the other

hand, for an individual businessperson or a small office, these printers offer professional-quality printing for street prices as low as \$1600.

As their name implies, laser printers use light to produce images. By contrast, dot-matrix printers hark back to typewriter technology; the printer contains a cluster of small rods, which produce images by pressing a ribbon against a piece of paper. Dot-matrix printers like the 72-dpi ImageWriter II provide adequate output for correspondence, rough image proofing, and labels; are the only machines able to print multipart, continuous-feed forms; and can print in color using a color ribbon. ImageWriters are slower than laser printers, but cheaper to buy and operate. The wide-carriage ImageWriter LQ has optional paper and envelope feeders that are very handy for volume printing, and the print

quality at 216 dpi is acceptable even for formal correspondence. (See the May 1988 *Macworld* for a review of the LQ; for more information on laser printers, see "Looking at Lasers" in the June 1988 issue.)

Getting your Macintosh to produce attractive copy on a printer that is neither PostScript-based nor specifically marketed for the Macintosh is more complicated than plugging in an Apple or an Apple-compatible printer. Unless you're willing to experiment with different cabling and interface schemes, we recommend that you avoid such printers.

Modems

Modems enable your Mac to "talk" to other computers over telephone lines. You can send documents instantly to another

How Much Does It Cost?

	Low (all vendors)	High (all vendors)	Apple List
CPU			
Macintosh Plus (1 floppy drive)	\$1250	\$1550	\$1799
Macintosh SE (2 floppy drives)	\$2297	\$2598	\$3169
Macintosh SE (20MB hard disk and 1 floppy)	\$2698	\$3090	\$3769
Macintosh II (1 floppy drive)	\$3445	\$3993	\$4869
Macintosh II (40MB hard disk and 1 floppy)	\$4365	\$5058	\$6169
Hard Disk			
20MB	\$500	\$1000	\$1099
40MB	\$769	\$1500	\$1699
70MB–80MB	\$969	\$1399	\$2799
100MB	\$1149	\$2295	n/a
140MB	\$1469	\$3295	n/a
Floppy Drive			
External 800K 3½-inch for Plus or SE	\$200	\$375	\$429
Internal 800K 3½-inch for II	\$200	\$299	\$299
RAM			
Two 1MB SIMMs for Plus, SE, or II	fluctuates	fluctuates	fluctuates
1MB upgrade kits (256K SIMMs) for Plus, SE, or II	\$300	\$400	\$349
Keyboard			
Regular	\$95	\$110	\$129
Extended	\$175	\$225	\$229
Mac II Monitor (incl. card)			
Apple 12-inch monochrome	\$675	\$775	\$898
15–19-inch monochrome	\$1099	\$1995	n/a
19-inch gray-scale	\$1750	\$3590	n/a
Apple 13-inch, 256 colors	\$1250	\$1425	\$1647
19-inch, 256 colors	\$3500	\$5295	n/a
SE/Plus Monitor (incl. card)			
15-inch monochrome	\$1000	\$1690	n/a
19-inch monochrome	\$1525	\$2390	n/a
Modem			
300–1200 baud	\$100	\$300	\$279
1200–2400 baud	\$175	\$500	n/a
AppleFax Modem	unavailable	unavailable	\$699
Printer			
ImageWriter II	\$360	\$488	\$595
ImageWriter II sheet feeder	\$182	\$245	\$299
ImageWriter LQ	\$995	\$1147	\$1399
AppleTalk card for ImageWriter II or LQ	\$113	\$114	\$139
ImageWriter LQ sheet feeder	\$249	\$299	\$299
ImageWriter LQ envelope adapter	\$39	\$40	\$49
LaserWriter IISC	\$2500	\$2799	\$2799
LaserWriter IINT	\$3945	\$4099	\$4999
LaserWriter IINTX	\$5525	\$5599	\$6999

For generic items, Low and High prices reflect actual prices of both Apple and third-party products in major metropolitan markets. In the case of Apple-only items, the Low and High prices reflect the range of discount prices we found. Low price estimates don't include university discount prices, which run 35 to 40 percent below Apple's list price.

Mac user, connect to a corporate database or to an online library catalog, leave questions on a software publisher's electronic bulletin board (BBS), or download a utility program from a user group's BBS.

Most modems can communicate at several speeds, measured in *baud*. In the United States, modems with a maximum speed of 1200 baud, though common, are rapidly being superseded by ones that operate at 2400 baud. The higher-speed modems are more reliable at any speed, will save you time and money if you make toll calls or connect to computerized services, and will serve as the standard for several years to come. They are available with different features from numerous vendors and are priced from \$175 to over \$500. Unless you're broke, buy a 2400-baud modem.

The communications software you need will depend on the type of computers you want your Mac to talk to, but all Macintosh communication software expects your modem to understand the commands originally employed in Hayes modems. Be sure your modem is Hayes-compatible. (See "Well-Connected" in the March 1988 *Macworld* for the full story on 2400-baud modems.)

Upward Mobility

Or, how to keep up with the Apples.

The Plus is cheap but limited; Apple doesn't provide the means to speed up or expand its operation. But because so many people use Pluses, we expect software vendors to supply applications for some time to come. Increasingly, the most sophisticated Macintosh software will take advantage of the power of the Mac II's 68020 processor. Mac Plus owners who want to use these programs can purchase upgrades from third parties, but these upgrades aren't really satisfactory for a variety of reasons. So don't plan on buying a Plus if you think you'll need to upgrade later; go with an SE, which was designed with upgrading in mind.

We expect the number of SE hardware enhancements and special-purpose peripherals to increase steadily for at least a few years, while developers' interest in Plus add-ons will likely wane. The SE's larger ROM and conformity to Apple's current hardware standards will make it easier for Apple to upgrade, and the expansion slot and better power supply will make third-party upgrades easier to buy and use.

If you buy a Mac II, there's no need to fear that you'll be locked out by hardware

Profile: John, the Garage Man

John owns an auto repair service and employs three auto mechanics and a receptionist/cashier. When we first talked to him, he used a pocket calculator and wrote bills and records by hand. Customer and inventory records were stored chronologically and were not always easy to access.

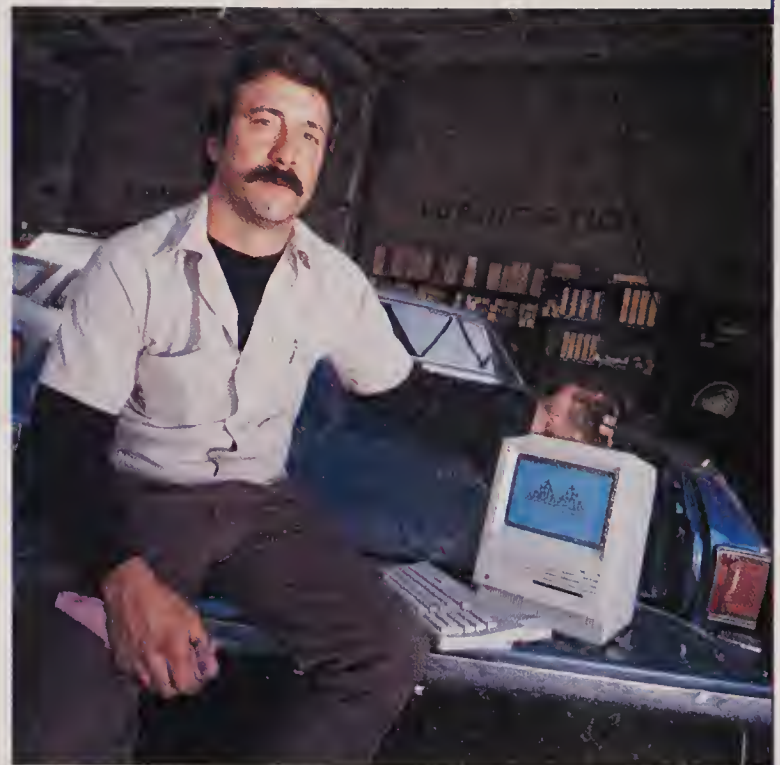
John wanted the Macintosh so he could handle routine record keeping, consult records quickly, and track inventory. He needed to input maintenance records, calculate and print bills, and post the parts used to an inventory record. John had no previous experience with computers, but the growth of his business required him to improve his operations as soon as possible. He had set aside \$15,000 for his purchase.

We recommended that John consider a system tailored spe-

cifically for his business. We told him about value-added resellers (VARs) who customize database software for specific purposes and sell the programming with Macintosh hardware and technical support.

For about \$10,000 John got a custom Omnis 3 Plus application, a Macintosh SE with 2.5MB of RAM, a 20MB hard disk, an ImageWriter II, the regular keyboard, and other software, including Microsoft Word and Front Desk. The Omnis 3 Plus application manages his customer records, billing, and inventory. The VAR set up John's system, showed him how to use it, and provides continuing assistance.

When the parts and estimating catalogs that John needs are available on CD ROM, he will buy a CD ROM player.



ROBERT CARDIN

or software incompatibilities. On the contrary, you'll be poised to take advantage of any new developments.

Parting Advice

Investigate software first. After selecting the programs that can do the job, find out which hardware will run them. Check for compatibility and then assess RAM and disk-space requirements. If you need special input or output devices, research them at the same time as you look at the Macintoshes.

If you don't intend to expand your computing capabilities, don't need an especially speedy system, have a small budget, or only intend to use the Mac for non-business functions, buy the Plus. It's reasonably priced, quiet, compact, runs a lot of Macintosh software, enables you to telecommunicate with other computers, and can be installed on a network if need be.

If you're going to use your Mac for business, then buy at least an SE. It's customizable, faster than a Plus, more durable, and yet is still transportable. If you must travel with your Mac, the SE is more convenient than the Plus, because you can have a hard disk and a modem or other accessory inside.

Buy a Macintosh II with a color monitor, lots of memory, and a big hard disk to compile and analyze lots of numbers, run CAD/CAM or document-design applications like MGMStation or Interleaf, or display color.

One good way to get disinterested advice on purchase decisions is to visit a Mac user group. Join a beginner's discussion. You can find a local users group by calling Apple's User Group Directory at

800/538-9696, extension 500, or by consulting "A Guide to Macintosh Users Groups" in the September 1988 issue of *Macworld*.

Usually there are several different configurations that can reasonably accomplish a given purpose. You might want to consider an SE with extras instead of a Macintosh II. If your budget allows, however, we recommend that you buy the more powerful machine and fewer extras. Your computer is the cornerstone of your system; with a more powerful one you'll be more productive now, and have the foundation for a versatile system later. □

The diagrams for this article were prepared with technical assistance from Wally Clegg, Macworld's technical services manager.

SuperStacks

*Blue-ribbon stacks from the
HyperCard stack contest*

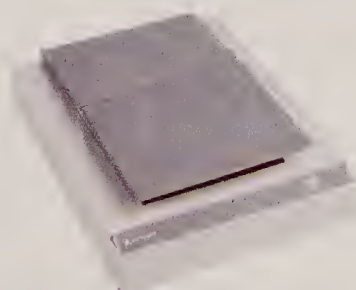
by Nancy E. Dunn



Farallon Computing's MacRecorder



Jasmine DirectDrive 45 hard disk



Datacopy Model 730 scanner

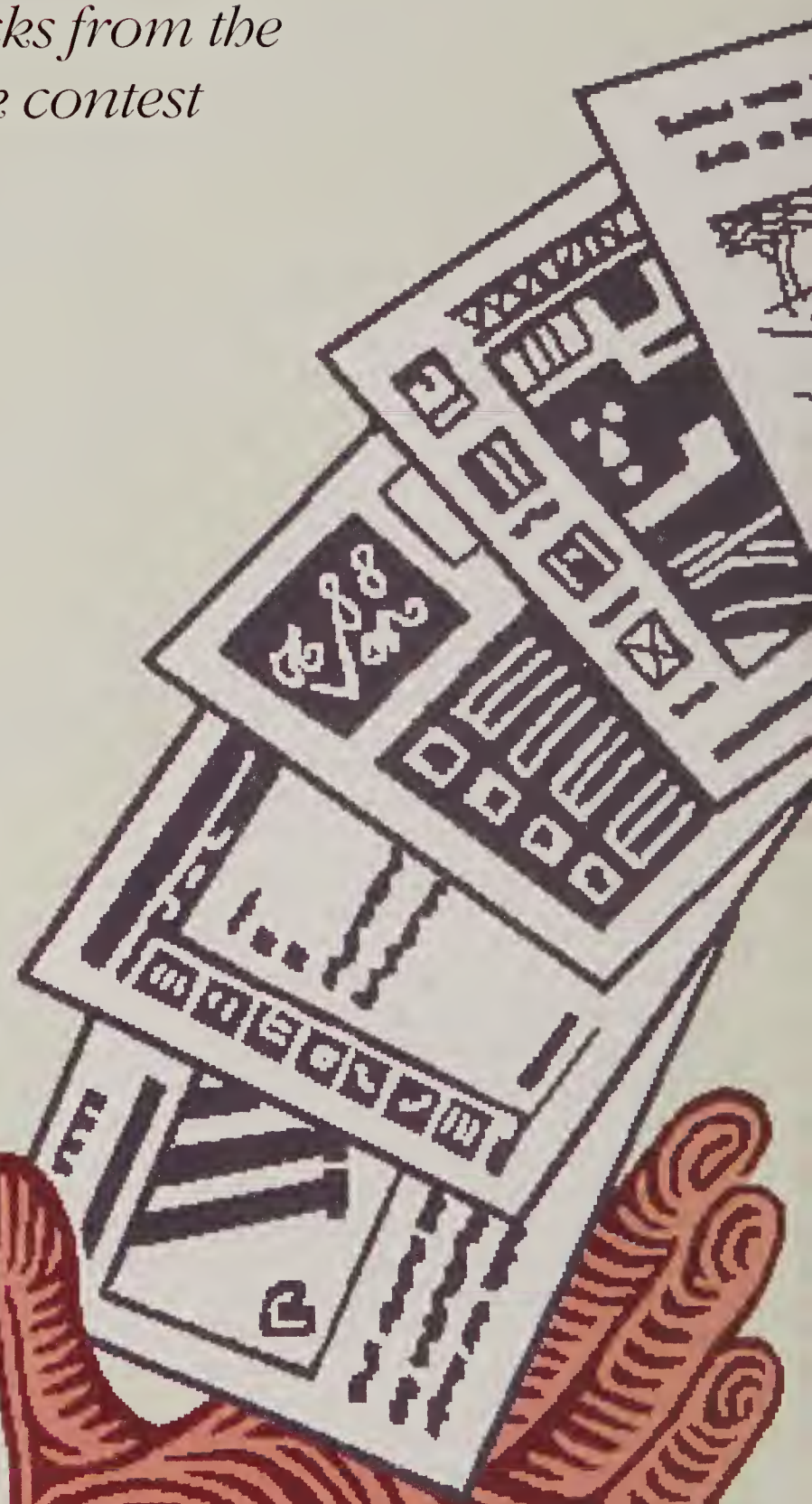


*National Semiconductor
8/16 Memory Expansion Board*



Apple Macintosh SE

The SuperStacks prizes, compliments of the makers.





And the winners are . . . Not so fast. No awards announcement would be complete without a few preliminaries. To start at the beginning, in May *Macworld* announced the SuperStacks contest, cosponsored by Apple Computer and Bantam Books. We wanted to see what stacks people had come up with in the first year of HyperCard's existence and to publicly recognize the excellence of the most outstanding stacks. We didn't really know what to expect.

What we got was more than 400 stacks of incredible variety, from annotated tarot decks to medical clinic stacks; from a field-surveying application to a Mayan date calculator; from a treatise on Objibwa Indian dialects to a construction estimator. There were even a few checkbook balancers and a couple of résumés. The effect was like opening the windows at *Macworld* and inviting in the world. At a few points we were wading up to our knees in stacks of stacks.

Despite the numbers, looking at the projects was an exciting task. Even stacks that had obvious weaknesses often contained an interesting effect of some sort, or a playful gimmick that kept us in good spirits as we looked through the heap of entries. (For a look at the cream of the crop, keep an eye out for *The Best of Macworld SuperStacks*, to be published by Bantam Books next year.)

The stacks that stood out were those that had obviously been designed with care, and had visual appeal and clear navigation paths. In fact, two of the winners, Don Niven and Pat Lynch, told us they had begun their projects by carefully designing the background card and overall scheme of their stacks.

With a couple of exceptions, the winners also reported that they had little or no programming experience before trying HyperTalk, and they universally praised it as a powerful, easy-to-use tool. And fast,

too. Pat Lynch probably summed it up best: "If you had asked me just a year ago whether I would ever be able to do this stuff, I'd have said, 'Yeah, over about a year, with a Pascal programmer by my side.'"

Apparently the actual scripting is not the hardest part, the design is. To restate a theme repeated by many winning authors: A stack ought to be as easy to use as a book, but it should take advantage of what the computer can do that a book can't.

Many thanks to our judges: Bill Atkinson, Doug Doyle, Mike Holm, Kristee Kreitman, Steve Maller, and Mary Planding of Apple, and Raines Cohen of BMUG. Special thanks to Lynn Knerr, Apple's third-party marketing manager, whose unflagging support made the contest possible.

The contest so inspired us that we'll repeat it next year. The deadline for entries will be March 15, so start scripting.

And now, without further ado, the winners.

Commercial

Commercial stacks are available through dealers or through mail order (for contact information, see *Where to Buy*).

Commercial: Development Tools

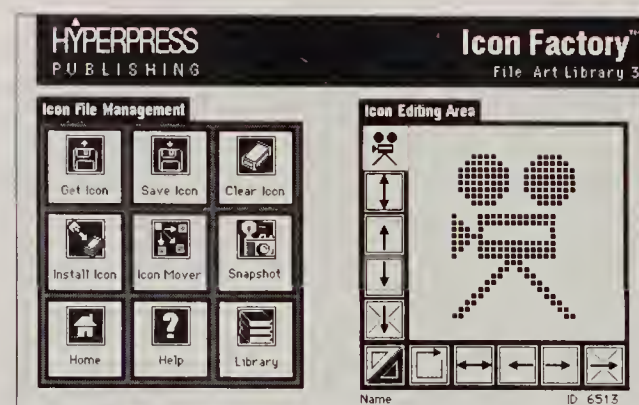
Icon Factory

David Gewirtz and James Paul

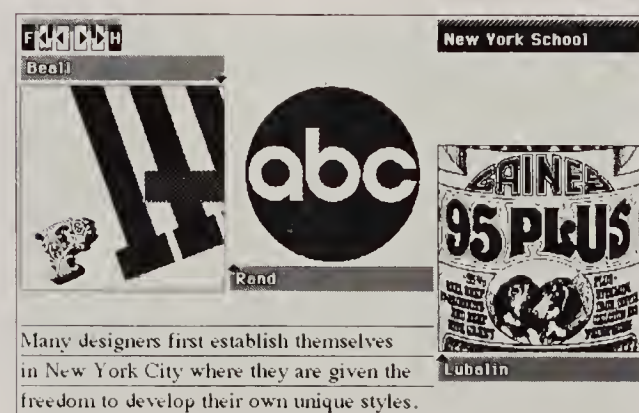
David Gewirtz, founder of HyperPress, noticed that although HyperCard is icon intensive, it comes with very few icons. And it lacks a built-in tool for creating icons. Until Icon Factory and the public domain XCMD MakeIcon came along, "the only way people could create new icons was by taking their System's life into their hands and making icons in ResEdit," says Gewirtz. Icon Factory takes that risk out of creating icons, and it includes a library of more than 2000 icons to use for inspiration or as a starting point for design. In creating Icon Factory, Gewirtz, who designed the interface, and James Paul, who wrote the scripts, focused their attention on what makes an icon effective in a program.

Here are a few of their guidelines: Make icons clearly understandable. Remember that icons never work alone, so icons within an application or within a group must share a consistent style. Reinforce the graphic message with a word that accompanies the icon to avoid miscommunication. And don't get carried away and produce a clutter of icons.

(A) *Icon Factory*
(B) *A Legacy of Graphic Design*



(A)



(B)



CYNTHIA MOORE

Members of the design team for the National Gallery of Art Laserguide take a break from their work: Bob Stein, codesigner; Steve Riggins, XCMD author; Jane Wheeler, editor. Stein likens HyperCard to "a lingua franca of electronic media."

Commercial: Formal Education
A Legacy of Graphic Design
 Don Niven

In teaching typography and design history at Saint Lawrence College in Kingston, Ontario, Don Niven has always emphasized the overlapping influence of designers. "Graphic design history really does lend itself to HyperCard's type of nesting and cross-referencing of information," says Niven. "As you move through the stack you see how the designers influenced each other; somebody may have studied at the Bauhaus and then moved to the USA." The stack complements Niven's design history class, but browsing in it would also be a good way for the average person to develop better visual literacy and an appreciation for the fundamentals of design. Niven plans other "legacy" stacks that illuminate the history of other fields.

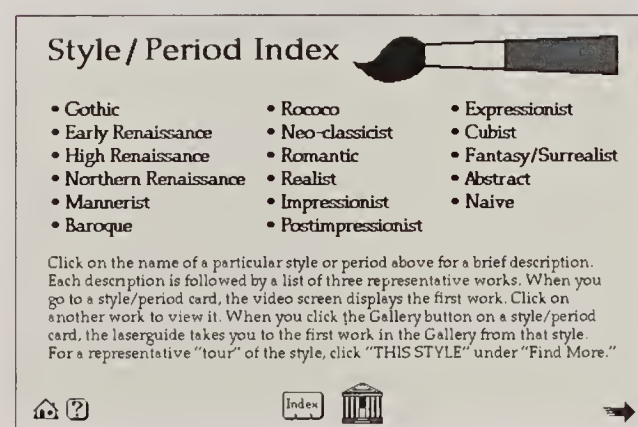
Honorable Mention Zhonghua
 John McCulloch. Teaches 500 words of Mandarin Chinese. An imaginative application with appealing graphic design. Due out in early 1989.

Commercial: Informal Education
National Gallery of Art Laserguide
 Bob Stein, Jane Wheeler, Steve Riggins, and Dale Bell

What Bob Stein and his group at the Voyager Company really want to do is create interactive video for consumers, like the

Aspen Project work done on mainframes at the Media Lab of MIT. While waiting for the technology to make that possible on personal computers, the company has made a name for itself by publishing definitive editions of classic films, with added commentary and footage.

The National Gallery Laserguide is the company's first HyperCard product, a self-guided tour of the cultural treasures housed in the museum and represented on videodisk by a 1645-image catalog of the museum's collections, a video-guided tour, and a videotaped history of the museum. You can search for images by artist name, time period, nationality, and style of art. And you can mark images to look at later in a series, as a slideshow.



(C)

(C) National Gallery of Art Laserguide

Though the stack is a vast improvement over hand-sorting slides, Stein thinks this is just the beginning. "What we're doing now is still quite trivial: people can only search and retrieve at a very basic level. We can't ask questions, we can't ask it to explain the difference between a Monet landscape and a Renoir landscape, though we can ask to see both."

Commercial: Information Management
Focal Point
 Danny Goodman

This was the first HyperCard product to reach the market, and it's still outstanding, particularly in its ease of use and its graphic design. Focal Point is the desktop organizer that Danny Goodman had always dreamed of having on a computer—a combination phonebook, scheduler, note-taker, client-and-vendor database, phone dialer and call-length monitor, billing program, and all-around right arm. If you have enough memory to keep it open on your desktop all the time, Focal Point could help you track expenses you might otherwise forget to bill for, clear your desk, and remember your mom's birthday. What

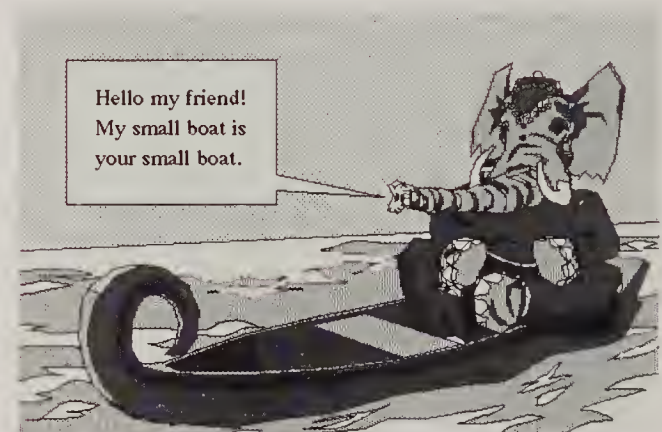
else could you want from an information manager?

Commercial: Information Publishing
Copyrights, Trademarks & Patents
 Kelly Hayes

At first glance, this text-heavy stack may not appear to be the ideal HyperCard application. But the information—guidelines for how to protect your material by copyright, trademark, or patent—is presented clearly and effectively. When Kelly Hayes and her husband started their software-development business, Aardvark Development Labs, they found that either they had to pay attorney's fees to find out about copyrights, trademarks, and patents or they had to spend hours on hold in an attempt to ferret the information out of the federal bureaucracy. Once the Hayeses gathered the information, people kept asking for advice, and so she produced this stack. It comes complete with blank HyperCard versions of the application forms to fill out in the stack. Designing HyperCard-size views of the ordinarily full-page forms proved a challenge that Hayes solved by using lots of fields and condensed type, which look fine in the

- (A) Focal Point
- (B) Copyrights, Trademarks & Patents
- (C) The Manhole
- (D) The Shakespeare Project

(A)



(C)

(B)



(D)

laser-printed final output. Updates are planned for the stack, as necessary, and the Hayeses are working on a similar guide to exporting.

Honorable Mention *Business Class*

Danny Goodman. Domestic and international travel information, singled out by the judges for its simplicity and ease of use.

Commercial: *Wild Card*

The Manhole

Rand Miller and Robyn Miller

The opening screen of *The Manhole* shows a manhole cover with a fringe of vines trailing out onto the road surface. When you click the cover, a beanstalk shoots up quicker than you can say *fee, fi, fo, fum*, and you're off exploring a fantasy world "peopled" by talking animals and dancing sea horses, accompanied by digitized sound effects. There's enough detail and variety in the environment to keep a child occupied for hours discovering all the hidden pleasures (such as a keyboard you can use to plunk out tunes, once you find it).

There's no goal in this adventure, and that's just the point. Years ago artist Robyn Miller wished for a game that didn't involve killing off bad guys or capturing booty, just exploring for the fun of discovery. When HyperCard came out, his mainframe-programmer brother thought it was the obvious way to make Robyn's dream come true. Robyn worked up the detailed drawings; Rand added the sounds and scripted it all together. Now the two are at work on another adventure, using MacroMind's VideoWorks HyperCard driver to produce 30-frame-per-second animation; it's due out in early 1989.

Honorable Mention *Your Faithful*

Camel Amanda Goodenough. A story stack about a noble and playful camel.

Custom

Custom stacks were developed to be used in a particular setting and are therefore not for sale.

Custom: *Formal Education*

The Shakespeare Project

Larry Friedlander

The Shakespeare Project is one of two SuperStacks winners that make abundant use of videodisk technology; this stack's audio and video capabilities make it stand out as the type of multimedia project that lights

the path to the future. Stanford University English professor Larry Friedlander developed a videodisk that contains filmed performances of contemporary theater on one side and scenes from Shakespeare's plays on the other side. Each scene from *Hamlet*,



Larry Friedlander demonstrates his *Shakespeare Project* stack.

Macbeth, *King Lear*, and other plays is presented in two versions by different companies to provide a variety of interpretations.

The stacks that access the filmed performances on the disk teach students about theater—from the construction of a play to staging and theatrical history. One section lets students watch Shakespeare performances; as they watch they can either choose a study aid or switch to the other version of the scene—arriving automatically at the same point in the drama. A Camera button lets students record parts of a scene to make notes about it, or to later include it in a report to support a point—this expands on the read-only format of the videodisk so it's much more valuable than a mere collection of film clips. "The idea," says Friedlander, "is to let you use the visual material as flexibly as you would use text material in your database." There's also a special audio track linked to the performances that contains the interior mono-

logues of the actors; students can choose to hear a character's thoughts instead of lines of dialogue, thereby understanding what motivates the character's words and behavior.

Custom: *Informal Education*

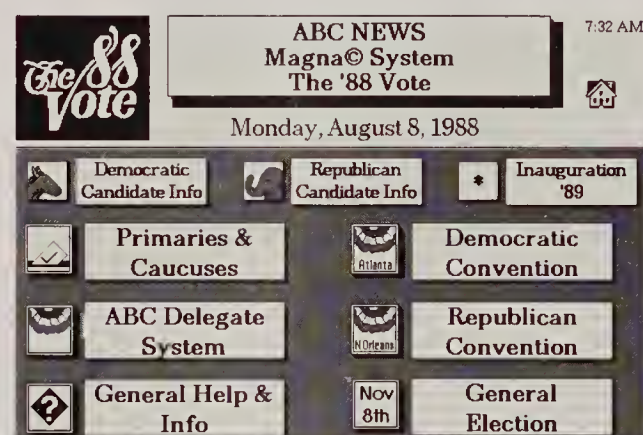
Honorable Mention *Alphabet for*

Adults Michael Giamo. A teaching tool for Drexel University's adult literacy program.

(A) *Alphabet for Adults*
(B) *Magna System: The '88 Vote*



(A)



(B)

Custom: *Information Management*

Magna System: *The '88 Vote*

David Bohrman

About a year ago, David Bohrman, a senior producer in the Elections Unit of ABC-TV News, was shopping for a computer. After visiting the Macworld Expo in Boston in August 1987, he went right out and bought a Mac II "with my own money." Intrigued by HyperCard, he experimented a bit and realized it was a nearly exact electronic corollary for the 5-by-7-inch index cards his group customarily typed up to assist anchors with live convention and election coverage. "I made up a sample of a few HyperCard cards and showed them to my

executive producer; he immediately saw there was something there." Though it was a challenge to get the Macs in the door at ABC, Bohrman ultimately produced an 18-megabyte HyperCard application of nearly 200 stacks with thousands of detailed cards on candidates, convention delegates, convention seating arrangements, past conventions, and so on, that are immediately accessible—a big improvement over the couple of hundred typed cards that was the practical limit of the old system.

Bohrman fixed up one Mac with a touch screen so anchor Peter Jennings could merely touch the screen to pull up the information he needed during the live coverage of the conventions. Reporters on the convention floor took with them eight-to-a-page printouts of cards covering the delegations in their territory.

Custom: *Information Publishing*

Summit Toronto

Patrick Lee, Murray Battle, Robin Mahon, George Bures Miller, Darryl Orth, and Brian Richmond

When the city of Toronto was preparing for the onslaught of 5000 journalists arriving to cover the June 1988 economic summit conference, it erected a tent-city media center where the international media pack would work, eat, and be entertained. Amid the tents was an information center to help the out-of-towners find their way around. In the information booth, the human attendants got an assist from four Macs running this winning HyperCard application. Equipped with a trackball instead of a mouse and keyboard, the Macs helped the lost, or merely curious, browse around maps and a skyline panorama of downtown Toronto, figure out the transit system, decide which restaurant to try, and so on. To make the stack simple to use for people unfamiliar with the point-and-click routine, the stack volunteers information if the trackball cursor merely passes over particular areas on some cards.

Remarkably, the team at Interaxis Visual Systems brought the entire 7MB stack into being in only two weeks. Robin Mahon, the graphic designer for the project, recalls, "We had quite an assembly line going. Someone did the sound, somebody else did the graphics, and we made templates for the different sections so one person would be working on the restaurants while another was working on the transit system, and then the last day we put it all together."

Honorable Mention **Celestial Wind Carillons HyperCard Catalogue** Nathan Farber. Descriptions of wind chimes, with clear digitized sounds and outstanding graphic design. Distributed as freeware in noncommercial channels.

Custom: *Wild Card*

Dave's Stack

Doug Gilbert, Dave Pollard, and Sue Pollard

Doug Gilbert designs hardware for the Mac. In fact, he was one of the founders of Levco, a company that started out by producing memory upgrades for the original 128K Macs. He met Dave and Sue Pollard through their children's school; and the Pollards had heard about Dave Harding, a young man who was seriously injured in a bicycling accident. Harding can't speak, and he has very limited mobility. Could a computer help Dave communicate? wondered the Pollards. Gilbert set to work with HyperCard. With the Pollards' assistance on the graphics, Gilbert produced Dave's Stack. One screen of the stack shows an alphabet that lets Dave spell out words by squeezing the button on the mouse. On another screen, Dave can select common phrases that a digitized voice utters for him. Still other parts of the application let Dave control his lamp and portable fan through a HyperCard interface with the X10 Powerhouse controller.

Gilbert recalls, "When we were working in Dave's room one day, the speech therapist for the care facility came in, saw what we were doing, and then wheeled in one of her other patients to try out the stack. She said, 'This is great, I know 20 other people who could use this.' So now Gilbert is at work improving the stack, and the three have formed Abilities Unlimited (619/943-7321), which plans to make the enhanced stack available commercially.

Noncommercial

The noncommercial category includes free stacks and shareware (programs distributed without cost, with the provision that people who like them after trying them out pay a fee to the author). Unless otherwise noted, the noncommercial stacks are available through user groups, such as BMUG (415/849-9114), BCS (617/625-7080), and the Apple Corps of Dallas (214/

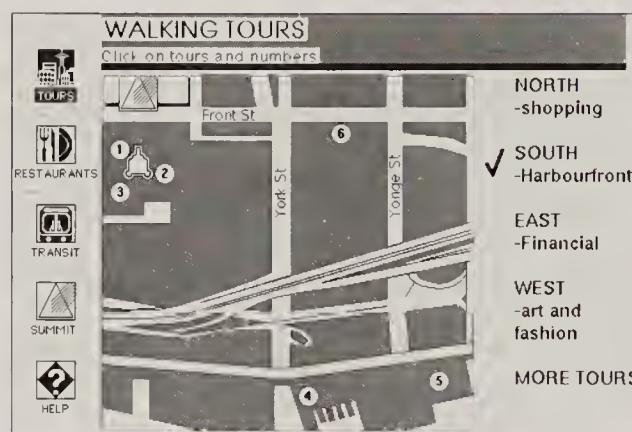
357-9185), or through online information services.

Noncommercial: Development Tools

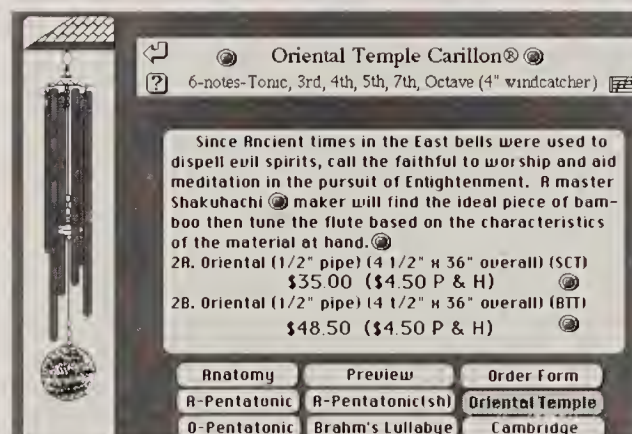
Honorable Mention **Developer Stack**

1.2r Steve Drazga; **Stack Starter** Robertson Reed Smith. Both of these stacks serve as libraries of public domain and shareware goodies to use as tool kits for building stacks. They are replete with buttons, XCMDs, XFCNs, and so on, and both are designed to allow you to expand on their collections.

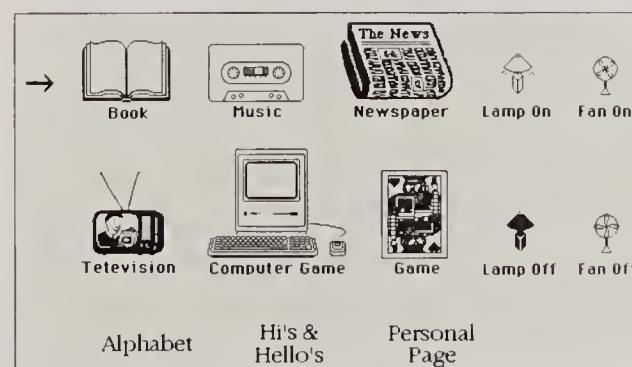
Steve Drazga's Developer Stack 1.2r has a button you can copy to a stack-in-progress that links directly to the Developer Stack. It works like a neighborhood convenience store; you can run out and quickly pick up one of its dozens of



(C)



(D)



(E)

(C) *Summit Toronto*

(D) *Celestial Wind*

Carillons Hyper-

Card Catalogue

(E) *Dave's Stack*

XCMDs, XFCNs, buttons, or scripts to finish the project.

Robertson Reed Smith's 1.2MB Stack Starter aims to be a comprehensive collection—for instance, it includes nearly 60 variations on directional buttons, plus a simple effects editor, and a grid for design-

- (A) *Guilty or Innocent?*
- (B) *Zoo*
- (C) *Curve Fit-Plot*



(A)

ing icons. In fact, Stack Starter offers such an abundance of tools that it may bewilder a novice scripter. Smith suggests taking a demolition-derby approach: make a copy of Stack Starter, and then delete anything you don't need.

Noncommercial: Formal Education ***Guilty or Innocent?***

Robert Fuller, David Winch, Karl Armstrong, and Andrew Fuller

Physics professors Robert Fuller and David Winch share a history. In the past academic year they were distinguished visiting professors at the U.S. Air Force Academy. Years ago, when the two were on sabbatical together, they created an award-winning physics-education application in Pascal on a Terak computer. This time the idea for their winning stack was a spin-off of their work with HyperCard as a videodisk driver. They drafted Air Force Lieutenant Karl Armstrong to help with the scripting, and Fuller's son Andrew contributed graphics. *Guilty or Innocent?* teaches principles of physics to high school students or beginning-level college students by having them investigate an auto collision to figure out whether the driver was speeding and then present their cases in court. Built-in randomness varies the situation each time the cartoon sports cars smash into each other, so the problem is different for each student. The two professors have returned to

their home campuses at the University of Nebraska at Lincoln, and at Kalamazoo College, in Michigan, where they have integrated the stack into their classes. They have been distributing the stack informally at academic conferences; now it's available for \$15 from the American Association of Physics Teachers, Publications Dept., 5112 Berwyn Rd., College Park, MD 20740, 301/345-4200.

Noncommercial: Informal Education

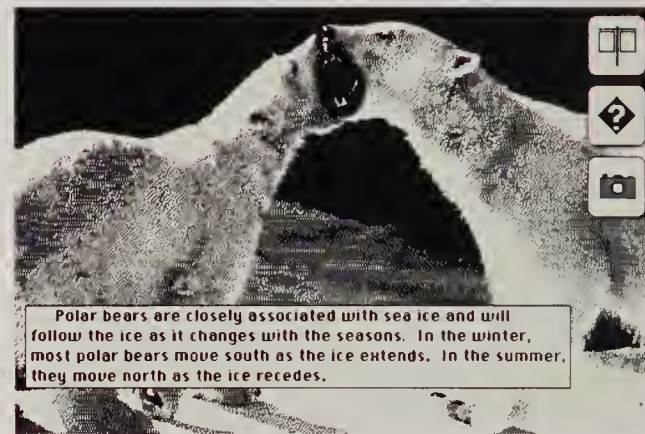
Honorable Mention *Zoo* David Combs. Games that help teach facts about animals to children.

Noncommercial: Information Management

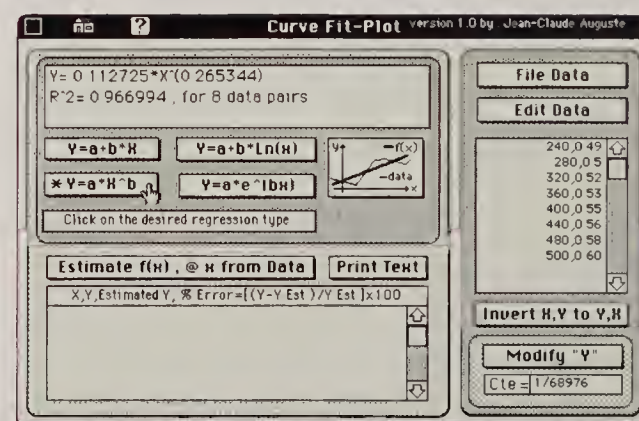
Curve Fit-Plot

Jean-Claude Auguste

Jean-Claude Auguste is a mechanical engineer whose work at the Polyloom Corporation of Dayton, Tennessee, requires him to plot the properties of plastics used in the design of plastic extrusion devices. Auguste developed versions of *Curve Fit-Plot* in BASIC and Pascal; he finally switched to HyperCard when it came out so he could include charts.



(B)



(C)

Curve Fit-Plot isn't for everyone, but people in some fields will find it's the sort of stack they'll want to paste right onto the Home card. Auguste explains how it works: "In the engineering field you pretty much solve all problems through mathematical models that simulate behavior. Curve-fitting is a way to obtain a mathematical model from a set of data." For example, if you don't remember how to convert degrees Fahrenheit to degrees centigrade, you could enter some data (0° C, 32° F; 37° C, 98.6° F; 100° C, 212° F; and so on) and then press a formula button to get the conversion formula.

Auguste is working on a new version that speeds the calculations and adds some statistical features. To obtain a copy of Curve Fit-Plot, send a blank disk, return postage, and an envelope to Jean-Claude Auguste, P.O. Box 621, Dayton, TN 37321.

Noncommercial: Information Publishing

Bird Anatomy

Pat Lynch

"At first I thought HyperCard was a cute little list manager that you could stick pictures in, and that was it," says Pat Lynch, medical illustrator and director of media

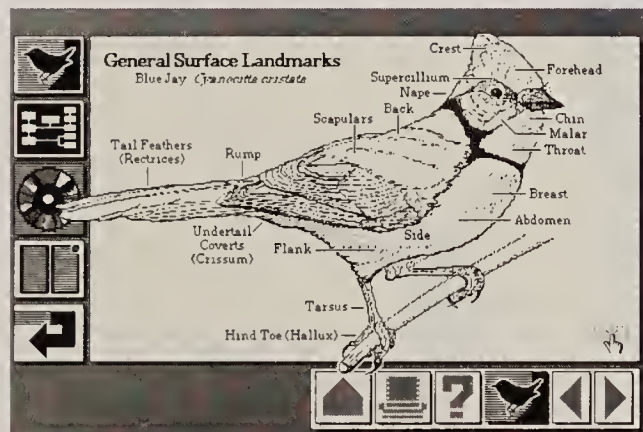
of the strengths of his stack: "I wanted to make the cards as dense as possible. One of the things that bothered me about early stacks I'd seen is that they were so shallow. I wanted my stack to be the HyperCard equivalent of a really good chapter on the subject." Although the cards have lots of options and information, the design is very clean and uncluttered throughout, making it easy to find your way around.

Noncommercial: Wild Card

Inigo Gets Out

Amanda Goodenough

This freeware stack is a brief interactive story that centers around the antics of Inigo, a fluffy blur of a black cat. Designed for children, the stack's simple charm appeals to grownups as well. In each drawing, the "reader" clicks wherever it seems likely that something will happen, advancing the action through trial and error. Sound effects accompany Inigo's stunts, whether he's frightening birds or fleeing from a snake. The drawings and animation are simple, but somehow Goodenough manages to convey a distinctly feline personality in the spray-paint blur of her character. Goodenough thinks her stackware characters seem lifelike because she bases



(D)



(E)

(D) Bird Anatomy

(E) Inigo Gets Out

production at the Yale School of Medicine. During a rainy weekend a couple of months later, he stumbled upon an idea stack that included some simple animation, and that got him going. First he created an animated beating heart. That led to collaborating with Carl Jaffe to create a HyperCard front end for Jaffe's cardiac-imaging videodisk. "I realized there were a lot of things you could do in HyperCard that I wasn't getting a chance to do in the cardiac project," says Lynch. And so, he scanned his drawings of birds onto the Mac, designed a good background card, and started plugging in the illustrations. Lynch explains one

them on her very real cat and the people she knows. The camel in her commercial stack Your Faithful Camel, for example, is modeled after her husband. Other camels in the opening screen of that stack are based on Mr. Spock of "Star Trek" and on Goodenough herself. The secret of her drawing technique? "I put my hand on the mouse and form a picture in my mind, and then just do it," she says. "Every time I produce a drawing I'm surprised, frankly." □



MAX SEABALL G11

The Great Write-Off

Which is the best powerhouse word processor: Microsoft Word, FullWrite, or WordPerfect?

by Jim Heid

As publications director for the Forest Society, a fictitious organization charged with saving fictitious forests, I get put through the mill in December. I'm responsible for producing the society's year-end report—a 50-page document containing a table of contents, a mix of single- and multiple-column text pages, graphics, footnotes, tables, and an index.

In previous years I used Microsoft Word for the job because no other program had the features I needed. But for Word's power, I endured a program with an often-confusing operating style. And then there was the infamous version 3.0, which had more bugs than a stand of old oaks. Yes, if Phil Donahue ever does a program on love-hate relationships, I'll be on the stage.

With the arrival of WordPerfect Corporation's WordPerfect and Ashton-Tate's FullWrite Professional, I have a choice. To find the best of the bunch, I produced the same report with Word 3.02, FullWrite 1.0, and WordPerfect 1.0.

Why don't I use a desktop publishing program for such a complex document? For one thing, no general-purpose publish-

ing program can automatically generate tables of contents or indexes or tie footnotes to the text that references them. For another, I don't have time to paste up reports with a publishing program. A program that handles everything from first drafts to final output gives me a better chance of meeting my deadlines. And finally, word processors are better tools for making and keeping track of revisions. Editing text in a publishing program means extra work to keep the original files current.

With that, The Great Write-Off begins—seven events, each designed to test different aspects of the three programs. (For more background on these and other programs, see "Getting Started with Word Processing," *Macworld*, October 1988.) For a preview of Word 4.0, which was scheduled to ship in October, see "Word 4.0: Improving the View."

EVENT #1: TYPING AND EDITING TESTS: *Responsiveness to fast typing; basic editing, selecting, and scrolling; keyboard shortcuts.*

Because a document begins at my fingertips, a word processor's typing and editing features play a large role in determining the program's usefulness. Indeed, when I'm doing more writing than fancy formatting, these basic features are the most important ones.

On a Mac II with 2 megabytes of memory, all three programs responded well to fast typing, but Word and FullWrite had the smoothest feel. On a 1MB SE, Word retained its spunk, but FullWrite slowed dramatically, showing a slight delay between each keystroke and the appearance of its character. With WordPerfect, when I inserted text in the middle of a paragraph, the program waited until I stopped typing before it adjusted line breaks; in the meantime, the text to the right of the cursor marched off the right edge of the screen. Very distracting.

Only Word lets you divide a single window into two panes, each with its own scroll bar (see "Splitting Windows"). These split windows let you view different sections of a document independently. This feature made editing my report easier, since I could display a key section in the top window pane while scrolling throughout the document in the bottom.

With all three programs, you can scroll using the numeric keypad or the enhanced keyboard's scrolling keys, but FullWrite drops the ball by not moving the cursor as you scroll. When you scroll to a given point and begin typing, FullWrite returns to where the cursor was before you scrolled. FullWrite's designers seem to

Jim Heid is a contributing editor of Macworld and a former typographer. He is currently writing an advanced user's guide to the Macintosh, to be published by Brady Books in 1989.

have missed the point of keyboard scrolling: to move the cursor without reaching for the mouse.

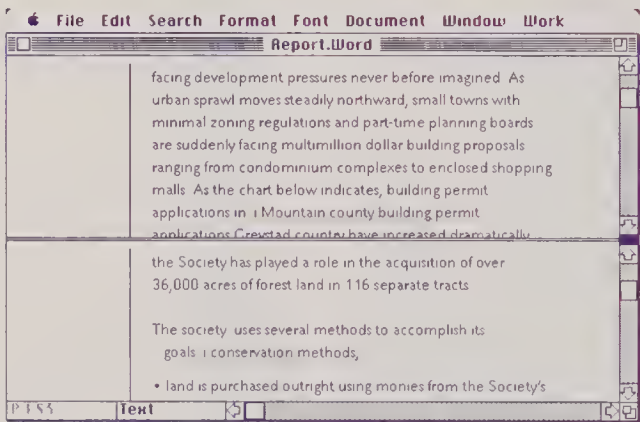
*The winner is: **WORD.*** Regardless of which Mac it runs on, Word responds smoothly to fast typing; its keyboard cursor-movement and editing shortcuts are the most complete, and its split-window option is handy in large documents. FullWrite's smart-quotes feature, which turns the Mac's straight quotes into opening and closing quotes (single or double) as you type, earns it second place.

EVENT #2: BASIC FORMATTING TESTS: *Specifying font, style, margins, and line and paragraph spacing; creating tables, hanging indents, headers, and footers.*

An important part of creating nearly any document is specifying its fonts, margins, and line spacing. The Forest Society's report has a simple design with just a few twists: different spacing between different paragraphs, a list of bulleted items with hanging indents, and some financial tables.

All three programs use on-screen rulers for adjusting margins and tabs, but each program stores those and other formatting attributes differently. Word uses an attached-to-paragraph approach: formatting changes you make apply only to the paragraph containing the cursor, or to currently selected paragraphs.

Word's approach made it easy for me to vary formatting from one paragraph to the next, but it made creating the tables



Splitting Windows

Only Word lets you divide a window into two panes, each with its own scroll bar. The panes scroll independently of each other. This screen shows two index entries, formatted in Word's bidden-text style.

Event #1: Typing and Editing

	Word	FullWrite	WordPerfect
Basic Typing and Editing			
Keystroke responsiveness	excellent	Mac II, very good Mac SE, good	
Convert quotes as you type	no	yes	no
Split windows	yes	no	no
Type over existing text	no	no	optional
Document Management			
Open multiple documents simultaneously	yes	yes	yes
Create backup upon saves	optional	optional	optional
Save automatically at intervals	no	optional	optional
Delete files from within program	yes	no	yes
Keyboard Cursor Movement			
One word at a time	yes	yes	yes
One paragraph at a time	yes	yes	no
Beginning/end of line	yes	no	yes
Beginning/end of document	yes	yes	yes
During keyboard scrolling	yes	no	yes
Option-drag scrolling	no	yes	no
Keyboard Editing Shortcuts			
Copy text without using Clipboard	yes	no	no
Move text without using Clipboard	yes	no	no
Select text from keyboard	yes	yes	yes
Delete next word	yes	yes	no
Delete previous word	no	yes	no
Delete to end of line	no	no	yes
Delete to beginning of line	no	no	yes
Delete next character	yes	yes	yes

more complicated. Since Word treats any line ending with a hard carriage return as a paragraph, I had to remember to select all the lines in a table before adjusting tabs (see "On the Tables"). If I didn't, one line's tabs would change but the others' wouldn't.

FullWrite uses a ruler-to-ruler approach, in which the ruler preceding the cursor controls margin and tab formats; to change those formats, insert a new ruler and alter it. This approach eliminates worries about where the cursor is and what is or isn't selected when you adjust a margin or move a tab stop, and this method makes creating tables a breeze.

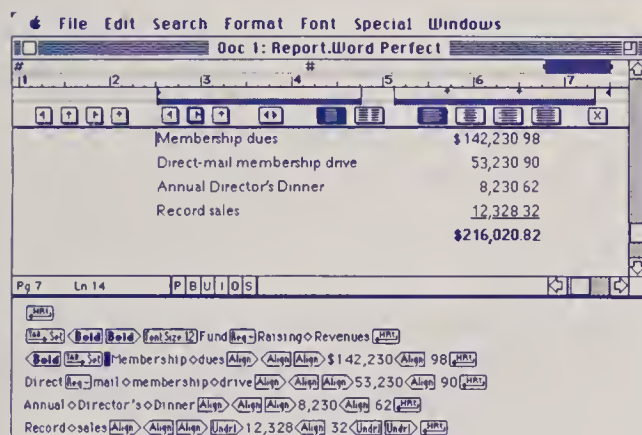
However, FullWrite fell flat when it came to inserting extra space between paragraphs. The only way you can do this is by altering the *base style*, which is controlled by the first ruler in the document. I

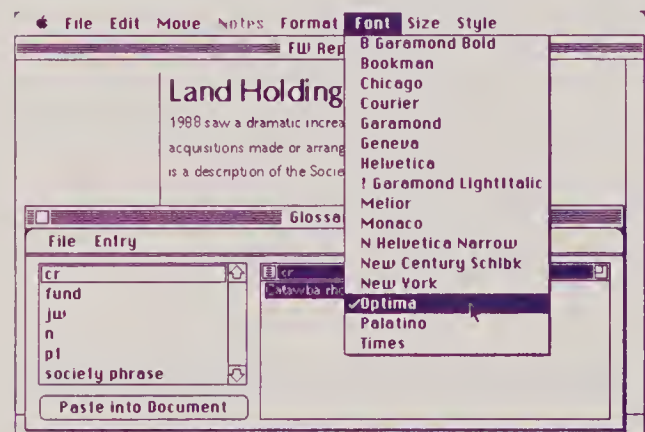
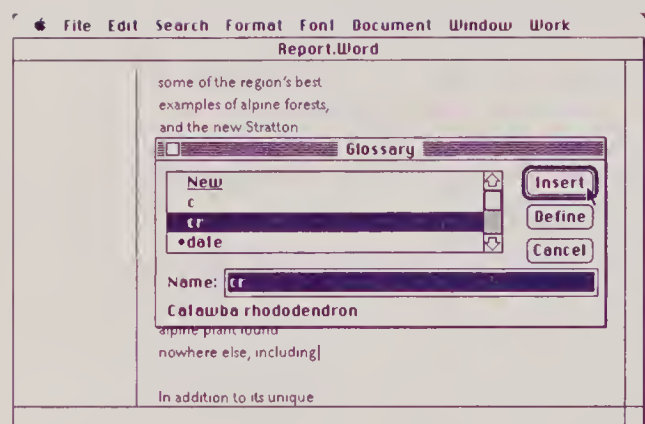
resorted to a variation of an old MacWrite workaround: I added a blank line between paragraphs, and then selected it and chose a small type size.

Codes

WordPerfect uses a code-oriented approach to formatting that shows this program's IBM PC heritage—and that occasionally frustrated me. When you issue any formatting command—from changing to bold to creating multiple text columns—the program inserts a code at the cursor's position. With many commands, including ones governing line spacing, margins, and tabs, if you don't explicitly select the text you want the format to apply to, WordPerfect applies it to all text from the cursor's position to the end of the document. Thus,

Event #1 Scorecard
Basic typing features and keyboard editing features are important when you're doing more writing than fancy formatting. In this event, Word takes first place; FullWrite comes in second.





Glossaries Compared

Word's glossary window (top) shows the text in each glossary entry, but doesn't show its font or style. Moreover, Word doesn't let you change the formatting of a stored entry. With FullWrite (bottom), you can alter a glossary entry using the program's formatting commands. FullWrite's glossary can't store a graphic, however. WordPerfect lacks a glossary feature, but you can store and recall repetitive text using macros.

Event #3: Advanced Editing

	Word	FullWrite	WordPerfect
Boilerplate Text Entry			
Glossary feature	yes	yes	no
Allow editing of glossary entries	no	yes	n/a
Allow graphics in glossary entries	yes	no	n/a
Allow reformatting of glossary entries	no	yes	n/a
Macro feature	no ¹	no	yes
Spelling Checker and Thesaurus			
Words in spelling checker	80,000	100,000	110,000
Checker ignores words in all capitals	optional	no	no
Checker detects multiple occurrences of same word	no	no	yes
Thesaurus shows definitions	no	no	no
Hyphenation			
Allow manual insertion of soft hyphens	yes	yes	yes
Hyphenate automatically as you type	no	yes	yes
Prompt you to hyphenate as you type	no	no	yes
Search and Replace			
Search and Replace for text attributes	no	yes	yes
Undo single-change operation	yes	yes	no
Undo change-all operation	yes	no	no

¹ Registered users receive a separate macro utility program.

Event #3 Scorecard
Advanced editing features let you store and recall repetitive text, check spelling, search for synonyms, automatically hyphenate text, and search for and replace text. FullWrite takes first place; Word finishes second.

document window, turning it into a header-editing window. Type the header text, choose the Close command or click on the window's close box, and the document reappears. The steps are the same for footers. Word's and FullWrite's separate header and footer windows are more convenient; you can switch between them and the main text with a mouse click. All three programs let you insert page-number codes in the header or footer.

Only FullWrite can display headers, footers, and page numbers in place on every page as you work. Word and WordPerfect show them in page preview mode only. (Word 4.0 will show them in position.) Word's page preview display also lets you adjust margins and page breaks, making it more useful than WordPerfect's Print Preview and FullWrite's Show Pages display.

The winner is: FULLWRITE. Its ruler-to-ruler approach makes complex tab and margin adjustments easier, and the pro-

gram's ability to display headers and footers in position gives you a better feel for a document's appearance. But FullWrite's severe paragraph-spacing limitations and its lack of keyboard shortcuts for changing fonts and type size make its margin of victory over Word small. WordPerfect's quirky codes and the way it commandeers the document window to display the header and footer earn it third place.

EVENT #3: ADVANCED EDITING

TESTS: Storing and recalling repetitive text; checking spelling; using an online thesaurus; hyphenating; searching and replacing.

The Land Holdings Report highlights the plant and animal species found in the Forest Society's preserves. I don't like typing "Catawba rhododendron" once, much

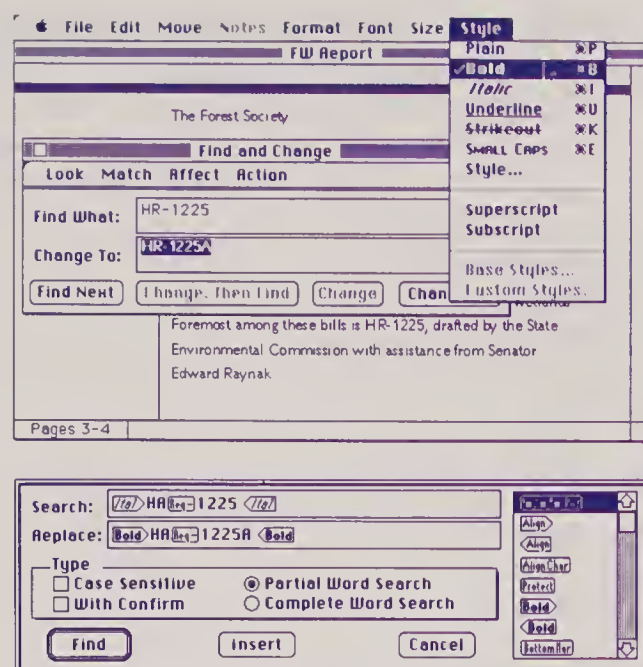
less 36 times, so I used each contestant's ability to store and recall repetitive text. Word and FullWrite have *glossary* features that hold any number of phrases in a single disk file. (You can also create separate glossary files, each for a specific task.) FullWrite's glossary can't store pictures, but otherwise, it beats Word's hands down. You can edit and even reformat text in FullWrite's glossary window; when you create a glossary entry in Word, the program saves the current font, size, and style (see "Glossaries Compared"). To edit a glossary entry, you must insert it into a document, change it, and then store it again.

FullWrite also lets you create *variables*, which differ from glossary entries in that when you change a variable's text, the program updates each usage of that variable in the document. Variables can also hold pictures.

WordPerfect lacks a glossary feature, but you can store and retrieve phrases by creating *macros*, which record and play back mouse movements and keystrokes. This process requires more steps than Word's or FullWrite's glossaries, but it has pluses. Macros are separate disk files; you can copy single phrases to other disks more easily. On the downside, because each phrase is a separate disk file and because the Mac allocates disk space in 1K chunks, WordPerfect uses more disk space to store the same amount of text than the glossary functions of the other word processors. Other drawbacks are that you can't capture a phrase you've already typed to store in a macro, you can't change a phrase's formatting without rerecording the macro, and you can't undo any events a macro plays back.

Spelling Checkers and Hyphenation

All three programs contain spelling checkers, and each has its strengths. Word's is the only one that lets you optionally ignore any word in all capital letters, preventing delays with documents containing acronyms, appendix names, or middle initials. WordPerfect's spelling checker has the largest dictionary and is best able to ferret out correct spellings based on phonetics. FullWrite's checker is the only one that lets you return to questionable words you skipped earlier in the document.



Finders, Changers

FullWrite and WordPerfect let you search for and replace text attributes. With FullWrite (top), you can format the search text and replacement text using the program's formatting menus. With WordPerfect (bottom), you must laboriously insert codes from a list of 90. Note that you can't even search for a hyphen by typing a hyphen; instead, you must insert the req.- (required hyphen) code.

Interestingly, FullWrite's checker showed an IBM PC bias: it offered to change *LaserWriter* into *Laserjet* (the IBM PC world's best-selling laser printer), and *MultiFinder* into *Multimate* (Ashton-Tate's PC word processor). A more serious problem surfaces if you use two consecutive hyphens with no space around them as a dash. FullWrite flags that common combination as a misspelling; Word and WordPerfect don't. And unlike Word and WordPerfect, FullWrite doesn't let you edit a document while the spelling checker's window is open.

The Land Holdings Report has narrow text columns, making it a prime candidate for automatic hyphenation. At your command, FullWrite and WordPerfect hyphenate automatically as you type. Word can hyphenate a selected word, a range of text, or the entire document. With an adjustable hyphenation zone and a prompted hyphenation mode, WordPerfect's hyphenation features are the most complete—in theory. In practice, I had trouble with them. Too often, the program wouldn't hyphenate words, even though doing so would have improved line breaks.

Search and Replace

After I wrote the Legislative Activities section of the report, the director told me she had given me the wrong number for one of the pending bills, and she wanted all bill numbers to appear in bold. It was search-and-replace time, and with FullWrite, the job was a cinch. While specifying the search and replacement text, you can use FullWrite's menus to specify text attributes (see "Finders, Changers"). Thus, in one swoop, I not only changed the bill numbers but made them bold too. Though I am glad I started early, because it took some time.

I also found a bug. When replacing text, FullWrite occasionally changes a double-spaced line into a single-spaced one. And unlike Word, FullWrite doesn't let you undo the effect of a Change All command.

WordPerfect can search for and replace text attributes and formatting codes, but it's a cumbersome process that requires using a scroll box listing 90 cryptic codes. And WordPerfect can't undo a global change, either, but it doesn't warn you of that ahead of time. In fact, WordPerfect can't even undo a single change operation.

*The winner is: **FULLWRITE**.* This program wins for its superb glossary and variables features, its strong spelling checker and thesaurus, for having the most versatile and reliable hyphenation features, and for its capable (though slow and buggy) search-and-replace function. Word fin-



ishes second, despite its inability to search for and replace attributes. WordPerfect's lack of a glossary feature helps earn it last place; macros just aren't as versatile or convenient. WordPerfect's spelling checker is better than Word's, but its hyphenation feature is quirky. And scrolling through droves of codes to search for and replace attributes is often more trouble than it's worth.

EVENT #4: TRACKING REVISIONS
TESTS: *Marking text for deletion; adding nonprinting notes to documents; marking changed text; tracking a document's editing history.*

In my office, reports endure an evolutionary process that would scare Darwin. A word processor with revision-tracking features helps me keep tabs on a report's journey through the approval loop.

With Word, you can indicate changed text by placing a vertical bar adjacent to paragraphs that have changed. You can also insert a nonprinting comment or note by formatting it in Word's hidden-text style, and mark text for deletion by formatting it in the strikethrough style (see "Tracking Changes"). In WordPerfect, choosing the Redline command places a vertical bar adjacent to a range of selected text, but there is no hidden-text style, so keep the Post-it Notes handy.

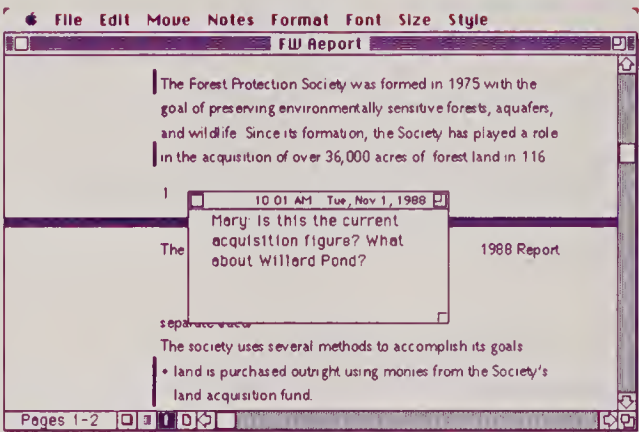
Then there's FullWrite. Click the change bars icon and FullWrite *automatically* creates a change bar whenever you alter a line. You can indicate doomed text with the strikethrough style, and you can type comments in "posted note" windows, which coworkers can open by double-clicking an icon in the left margin.

The winner is: FULLWRITE. In this event, Word and WordPerfect stand as much chance against FullWrite as Guam's ski team would against Switzerland's. FullWrite's automatic change bars and its Get Info command are the keys to its victory. Its posted notes are excellent, although you can add notation features to most any application by using Deneba Software's Comment DA.

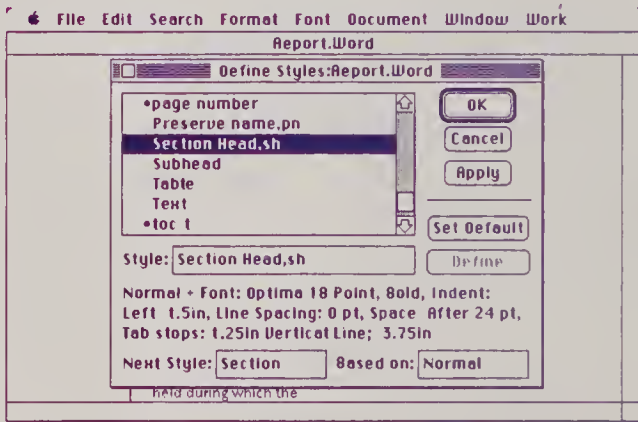
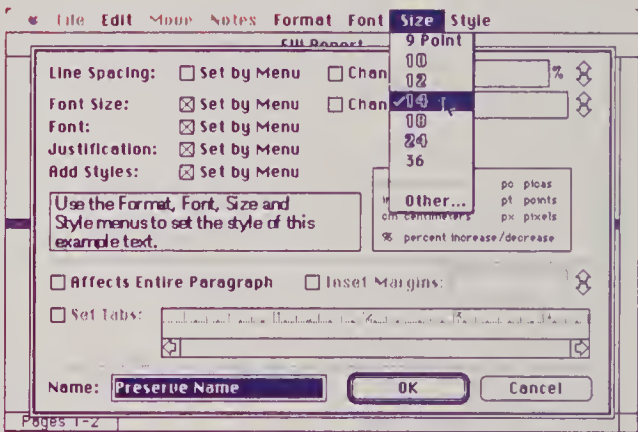
Event #4: Keeping Track of Revisions

	Word	FullWrite	WordPerfect
Revision Tracking			
Automatic change bars	no	yes	no
Manual change bars	yes	no	no
Strikethrough text style	yes	yes	yes
On-screen notes attached to text	no	yes	no
Hidden text	yes	no	no
Document Information			
Word count	no	yes	yes
Character count	yes	yes	no
Line count	no	yes	no
Document history	no	yes	no

Event #4 Scorecard
Revision-tracking features let you add nonprinting comments to documents and mark passages that have changed since the last revision. FullWrite beats the others easily.



Tracking Changes
FullWrite has the best revision-tracking features of the three programs. FullWrite automatically places change bars next to altered text. And you can attach time- and date-stamped posted notes to text. In Word and WordPerfect you can create change bars, but you must do so manually for each change by choosing a command.



Style Sheets Compared
In FullWrite (top), you create a style sheet by issuing formatting commands to alter the appearance of a sample sentence. In Word (bottom), you can define a style by issuing formatting commands while the Define Styles dialog box is open, or you can select some existing formatted text and store its formatting in a style. As shown here, Word lets you create abbreviations (following the style name) for style sheet names—useful for summoning style sheets from the keyboard.



Word 4.0: Improving the View

Competition is the mother of invention. Feeling the heat from FullWrite and WordPerfect, Microsoft last summer unveiled the first major Word upgrade in almost two years. While a formal review will have to wait until the final version ships, a preview of Word 4.0, due out in October, reveals some significant new features.

- A new viewing mode, called Page View, that shows how a document will appear when printed—with headers, footers, and multiple columns in position (see “Page View”). You can type, edit, and reformat the document while using Page View. For fastest performance, Word’s traditional viewing mode, now called Galley View, remains.

- A spreadsheetlike table-editing feature that simplifies creating complex tables. Text wraps within each tab cell, allowing you to create and revise multicolumn tables without laboriously adjusting tabs and editing text. You can add borders and rules to tables and use different fonts, sizes, and styles within each cell.

- An all-new outlining mode. Word 3.0’s outliner probably helped sell many copies of Acta. Word 4.0’s outliner

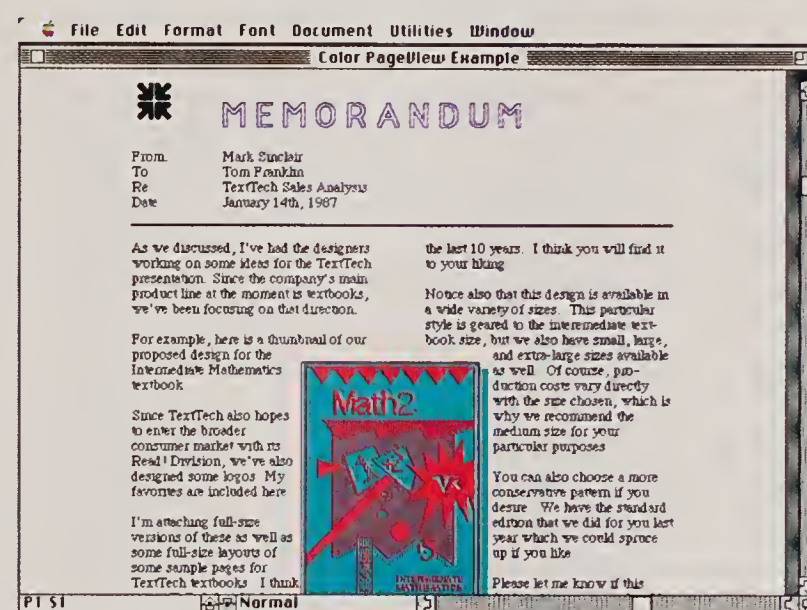
is easier to use and provides more visual feedback when you’re moving items within the outline.

- Electronic mail support. On networks that use Microsoft Mail (formerly InterMail), you can send and receive mail within Word. Instead of writing a note, saving it, then sending the disk file, you simply write the note and choose the Send Mail command.

- Complete customizing. You can literally redesign Word 4.0’s menu bar, adding and re-

moving commands, moving them to different menus, and assigning keyboard shortcuts. You can save and load different customizing settings, too: if several people use one copy of Word, each can have his or her own custom settings.

- Goodies galore. Smart quotes, background repagination, word count, line numbering, color support, a style sheet pop-up menu in the ruler, and more. And Microsoft claims it all runs on a 512K Mac.



Page View

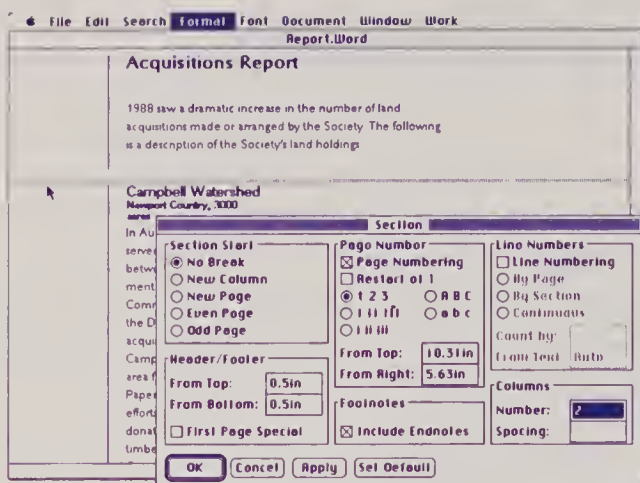
Word 4.0’s Page View mode shows a document as it will appear when printed. This document also illustrates Word 4.0’s ability to import color graphics and to format text in color.

EVENT #5: ADVANCED FORMATTING TESTS: Automating repetitive formatting; creating multicolumn pages; viewing and controlling page breaks; mixing text and graphics; creating rules; kerning.

I may not want to use a publishing program, but I do want my report to look good. A few simple techniques give it a professional look without forcing me to grapple with on-screen pasteup.

One technique involves using several different sizes and styles of the same font to give the text some typographic diversity while retaining the report’s graphically simple design. To avoid countless trips to the formatting menus, I used Word’s and FullWrite’s style sheet features and WordPerfect’s macro recorder to automate switching between these different sizes and styles.

Word lets you create a style sheet in two ways. Choose the Define Styles command, name the new style, use the ruler and the Font and Format menus to specify the style’s characteristics, and then click Define to save the style (see “Style Sheets Compared”). Or, create styles by example: format text as desired, and then choose Define Styles, type a name, and click on Define. I found the second method more



Columns in Word

To mix column widths on the same page in Word, insert a section break (see pointer) by pressing **⌘-Enter**, then choose **Section** from the **Format** menu, click **No Break**, and specify the number of columns. Use the **Page Preview** command to see how the page will look when printed.

convenient: it allowed me to experiment until I got the look I wanted and then save the results.

Because each land preserve's description follows the same format, I used the **Define Styles** dialog box's **Next Style** box to tell Word to automatically switch from one style to another when I pressed **Return** to end a paragraph. Doing so allowed me to type and format each description without having to manually summon each style.

FullWrite can't automatically switch from one style to another, and it lacks a style-by-example feature, but creating style sheets is still easy. Choose **Custom Styles** from the **Style** menu, click **New**, and then use the **Format**, **Font**, **Size**, and **Style** menus to change the appearance of the sample sentence in the dialog box.

Unlike Word, FullWrite applies styles cumulatively; when you choose a style for text you've already formatted using a different style sheet, FullWrite applies the second style to the text, but retains the formatting attributes that went unchanged from the first style. Thus, reformatting text from one style to another is often a two-step process: restore the text to its base style by pressing **Option** and choosing **Base Style** from the **Style** menu, and then choose the new style.

Besides allowing faster formatting, style sheets allow easier updating. When the director decided she didn't want the

preserve names to appear in italics, I simply changed the appropriate style sheet, and Word and FullWrite reformatted the names throughout.

WordPerfect lacks style sheets, so you can't quickly update the appearance of all text formatted in a given style. You can record and play back macros that choose various formatting commands. Because macros can't be altered, however, I didn't use them for formatting until the document's design was finalized.

Columns and Sidebars

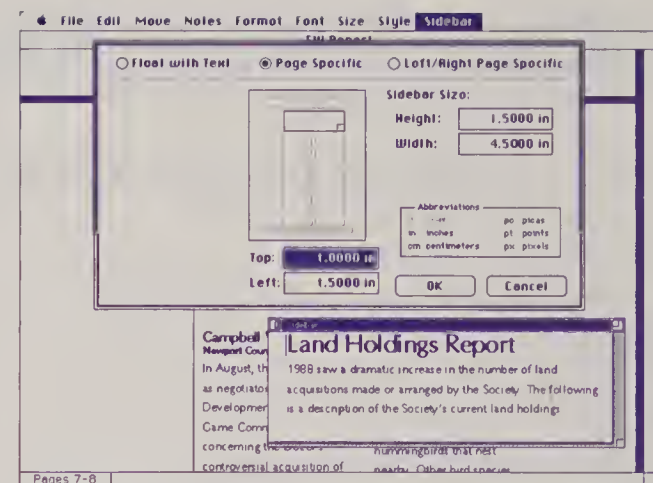
Another way I spruced up my report was to use a mixture of one-column and multicolumn pages. Most of the report is formatted in one column. Some sections of the report have two- and three-column pages and begin with a headline spanning the columns.

Creating multicolumn pages was easy with all three programs, but when I mixed full-width text and multiple columns on the same page, things got tricky. With Word, mixing column widths means using the **Section** command. First, position the cursor where you want the new column setup, then insert a section code by typing **⌘-Enter**. Next, with the cursor in the new section, choose **Section**, click on the **No Break** button, and specify the number of columns. Finally, use the **Page Preview** command to check your work (see "Columns in Word").

FullWrite makes you work harder, but gives you more in return. Mixing column widths on the same page means creating a *sidebar*—a kind of document within a document, a separate window with its own rulers and independent formatting (see "FullWrite Sidebars"). Using the **Sidebar** menu's **Place** command, you can position a sidebar anywhere on the page by simply dragging its outline.

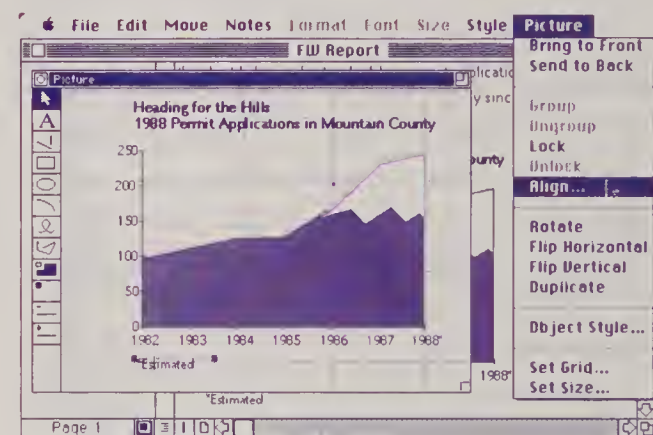
On the downside, you can't edit or reformat a sidebar's text directly on the page; you must open the sidebar window. As the number of sidebars in my report grew, this extra step slowed me down. And when creating and fine-tuning a sidebar, you can't adjust its position by dragging it directly on the page. You must choose the **Place** command, make an adjustment, and return to the page—again and again, until the sidebar is where you want it.

WordPerfect's code-oriented style makes mixing column widths surprisingly easy. Using the **Columns Options** com-



FullWrite Sidebars

FullWrite's sidebars—separate windows with independent rulers and formatting—allow great flexibility in mixing column widths, but can be cumbersome to work with. Here, a sidebar contains the page's one-column introductory text, while the main text appears in two columns. The **Place** dialog box lets you position and resize a sidebar using the mouse or by typing specific values.



Drawing with FullWrite

FullWrite's picture panels provide MacDraw-like object-oriented drawing tools and also hold bit-mapped graphics pasted from the Clipboard. Here, graphics spruce up an Excel chart.

mand in the **Columns** submenu causes WordPerfect to insert a column-definition code at the cursor's position. So, to change from one column to two, position the cursor where the two-column text will begin, choose **Column Options**, specify two evenly spaced columns, and click on **OK**. To return to one-column text, position the cursor where the single-column text will begin and choose **Columns Off** from the **Columns** submenu.

The biggest problem with WordPerfect's columnar features is that you can't create footnotes or adjust margins on multicolumn pages. If you want footnotes, you



can't have columns, and vice versa. That squirrely design quirk forced me to turn a few footnotes into parenthetical comments.

Widows and Images

An important part of polishing my report's appearance was verifying that no page ended with a *widow*—the first line of a paragraph separated from the rest of the paragraph by a page or column break. Word's and WordPerfect's widow-control features prevent widows by moving the stranded line to the next page or column. Word offers the most control over where and when paragraphs break. FullWrite lets you control widows, although it calls them *orphans*. (A true orphan is the last line of a paragraph appearing by itself on a page.) Controlling paragraph breaks, however, involves manually inserting page breaks or carriage returns, which means more work when editing changes alter the page length.

The Forest Society report contains some charts and scanned map images. All three programs let you paste graphics from the Clipboard and resize them, although WordPerfect doesn't display or allow you to specify a precise percentage of enlargement or reduction. And only FullWrite lets you draw graphics from scratch. Its built-in drawing tools let you create object-oriented graphics. I didn't think I'd find a use for built-in drawing, but then I thought of modifying the Mountain County building permit chart to resemble a mountain (see "Drawing with FullWrite"). I'm an old hand

Event #5: Advanced Formatting

	Word	FullWrite	WordPerfect
Automatic Styling and Formatting			
Style sheets	yes	yes	no
Macros	no ¹	no	yes
Styles can apply within paragraphs	no	yes	n/a
Style or macro names appear in menu	optional	optional	no
Keyboard access to styles or macros	very easy	fairly easy	fairly easy
Style by example	yes	no	n/a
Next style feature	yes	no	n/a
Current style name appears in document window	yes	no	n/a
Multiple Column Controls			
Newspaper (snaking) columns	yes	yes	yes
Parallel (side-by-side) columns	yes ²	no	yes
Mixing column widths on same page	easy	fairly easy	easy
Multiple columns and footnotes on same page	yes	yes	no
Page and Paragraph Controls			
Forced page breaks	yes	yes	yes
Option for keeping paragraphs together	yes	no	no
Option for keeping lines together	yes	no	no
Widow control	yes	yes ³	yes
Orphan control	no	no	yes
Typographic Controls			
Automatic kerning	no	no	no
Smallest kerning unit	0.25 point	.05 em	1.00 point
Gray-scale text	no	yes	no
Fractional character widths	optional	yes	optional
Can print sidebars with white text on black	no	yes	no
Importing and Creating Graphics			
Accept graphics from Clipboard	yes	yes	yes
Resizing graphics	very easy	easy	very easy
Provide built-in drawing tools	no	yes	no
Can print picture in page background	no	yes	no
Wrap text around irregular graphics	no	optional	no
Create borders and boxes around paragraph	yes	yes ⁴	no
Size graphics by percentage	yes	yes	no
Create column rules	yes ⁵	yes	no

¹ Registered users receive a macro utility.

² Paragraphs appear alongside each other only in Page Preview mode and when printed.

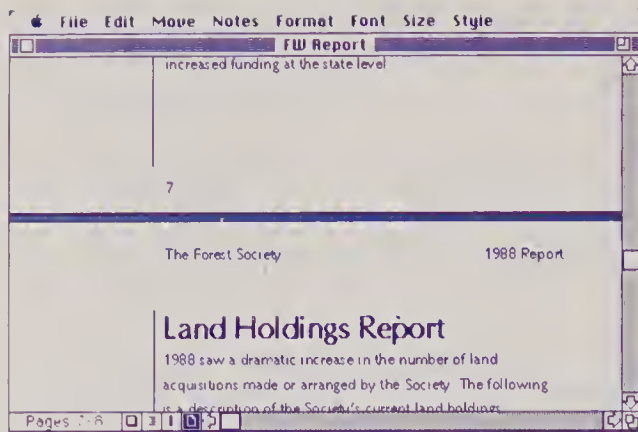
³ FullWrite calls a *widow*—the first line of a paragraph appearing by itself at the bottom of a page—an orphan.

⁴ In FullWrite, creating a box or border around a paragraph is a cumbersome process.

⁵ Using vertical-bar tabs.

Event #5 Scorecard

This event assesses each program's page-layout features, from kerning to creating multiple-column pages. Word and FullWrite share first place, with FullWrite offering better kerning and graphics features, and Word boasting superior control over paragraph spacing.



Broken Rules

FullWrite's column-rule feature would have been ideal to produce the vertical rule on these pages, except that the rule doesn't extend into the footer, page number, or header areas. In Word you can use a vertical-bar tab to produce a vertical rule, but again, it's impossible to get the rule to run the entire height of the page. WordPerfect can't produce a vertical rule at all.

at MacDraw, so I caught on to FullWrite's drawing features quickly, although I missed having on-screen rulers and a freehand drawing tool.

Desktop Publishing

My closest brush with desktop publishing came when I added a vertical line, or *rule*, to each page. The column rules in FullWrite's Layout dialog box did the job with a single mouse click. But column rules don't appear in headers or footers, so my rules didn't extend the full height of the page (see "Broken Rules"). Word was no better; I used vertical-bar tabs to create rules, but I couldn't get the rule in a header or footnote to meet the rule in the body of the text. WordPerfect has no rule-drawing features at all. It's surprising that none of these highfalutin formatters can draw a simple line from the top of the page to the bottom.

Ah, but they can kern. You can improve the appearance of large type by reducing the amount of space between each character. FullWrite allows the most precise kerning, using increments of .05 em; that is, five hundredths of the width of the current font size. Word finishes second, with a minimum spacing increment of .25 point. WordPerfect lets you add and subtract space in 1-point increments—too large for precise spacing control.

The winner is: It depends. For importing and creating graphics and for the most precise kerning, it's FullWrite. FullWrite also offers tremendous flexibility in mixing different formats and column widths on the same page, although its sidebars can be cumbersome. For the best style sheets and the ability to control where and whether paragraphs can divide, it's Word. WordPerfect tackles multiple columns well, but its lack of style sheets, crude kerning, and inability to print footnotes on multicolumn pages place it last.

EVENT #6: DOCUMENT ASSEMBLY TESTS: *Creating a table of contents and an index.*

One of the last steps in preparing my report was to add the table of contents and index. All three word processors made the job of preparing these vital sections far easier than doing it by hand. In each program, creating a table of contents and creating an index involve nearly identical steps, so I'll concentrate on the table-of-contents process here.

With all three programs, the first step in creating a table-of-contents entry is to place the cursor at the start of the section to be referenced, and then specify how you want the contents entry to read. In Word, you can mark an existing headline or chapter title: type the characters *.c.* (*period, c, period*) before the headline and then format the characters as hidden text (see "Word Contents Page"). You can also designate up to nine levels of subentries (sections within sections) by placing numerals 1 through 9 after the contents code.

Occasionally, you need a contents entry for a page that doesn't contain a chapter or section title. In such a case, I typed the entry as I wanted it to appear in the table of contents, added the *.c.* code, and then formatted the entire line (not just the contents code) as hidden text.

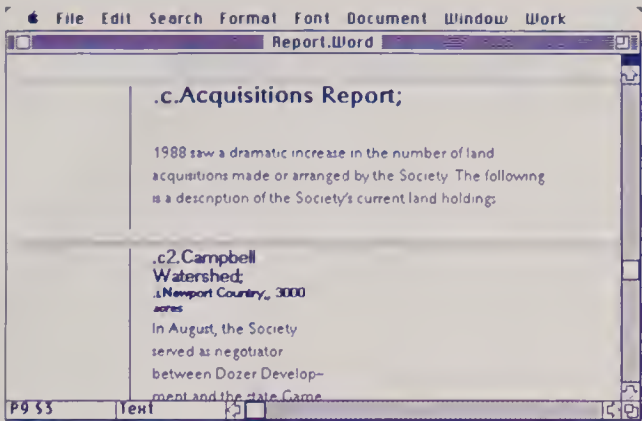
To generate the table of contents, choose Table of Contents from the Document menu, choose the *.C.* Paragraphs button, and click on OK. Word churns through the document and creates a new table-of-contents section at the beginning of the document. You can edit and reformat the text in that section and move it elsewhere (I moved it to follow my report's title page).



If typing codes seems too primitive, you'll love FullWrite's approach. FullWrite stores contents entries in small windows, or *panels*, similar to its posted notes. Place the cursor where a section starts and choose Contents from the Notes menu. Type the contents entry and use the Format, Font, Size, and Style menus to format it as desired (see "FullWrite Table of Contents"). If all entries should look similar, use the Base Styles command to define a new base style for contents entries. After you close the panel, FullWrite adds that entry to the contents page. Unfortunately, you can't directly edit or reformat the entries in the table of contents. Instead, you must open the entry's panel and modify the text therein. That two-step process gets old quickly.

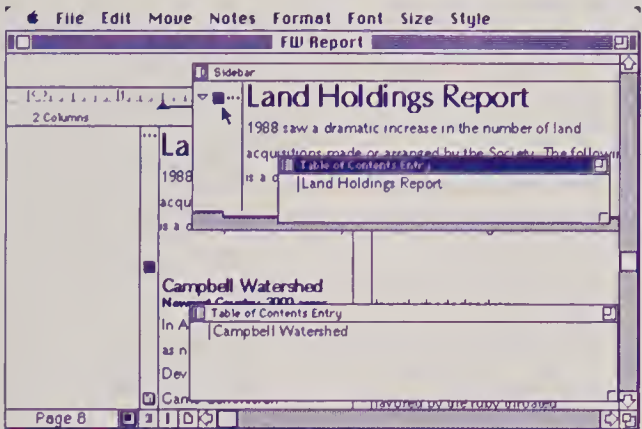
FullWrite's indexing features have one significant limitation: each index entry's page number always appears aligned against the right margin. You can't change that to have the entry and its page number separated by a comma and a space, which is how indexes are supposed to appear.

WordPerfect nicely straddles the fence between Word's cryptic codes and FullWrite's on-the-fly approach. First, place the cursor where you want the contents page and choose Table of Contents from the Define Lists submenu. Next, select a heading or chapter title and choose Table of Contents from the Mark Text. Choose a level for the entry, and click OK. You must select some existing text on the page to create a contents entry for that page. To create a



Word Contents Page

To create a table-of-contents entry in Word, type .c. before the text and an “end” code—here a semicolon (;)—after it, then format both codes in the hidden-text style. For sections within sections (up to nine), add the appropriate numeral to the end of the code. Creating index entries is a similar process. Before compiling the table of contents or index, however, be sure to hide the hidden text using the Preferences command. Otherwise, visible hidden text may affect page breaks, making the contents page and index inaccurate.



FullWrite Table of Contents

In FullWrite, you create a table of contents or index entry by typing its text in a table-of-contents or index panel. FullWrite updates a table of contents and index as you edit your document, a process that often leads to formatting delays.

contents entry for the director’s letter, I selected the letter’s salutation, then edited the resulting entry, changing it from *Dear Member:* to *A Letter from the Director.*

The winner is: **WORDPERFECT.** FullWrite’s contents and indexing features are the easiest to use, but Word’s and WordPerfect’s are the most flexible. Only FullWrite updates the contents page and index as you work. That’s convenient, but it slows the program, especially as a document grows. An option for disabling automatic updating

Event #6: Document Assembly

	Word	FullWrite	WordPerfect
Table of Contents Generation			
Require typed codes for contents entry	yes	no	no
Require on-page text for contents entry	no	no	yes
Maximum levels of contents	9	1K	5
Generate and update contents on the fly	no	yes	no
Allow on-page editing of contents	yes	no	yes
Ease of use of contents features	fairly easy	very easy	easy
Flexibility of contents format	excellent	very good	good
Index Generation			
Require typed codes for index entry	yes	no	no
Require on-page text for index	no	no	yes
Generate and update index on the fly	no	yes	no
Allow on-page editing of index	yes	no	yes
Page numbers appear aligned right	optional	yes	optional
Page numbers appear next to reference text	yes	no	yes
Ease of use of index features	fairly easy	very easy	easy
Flexibility of index format	excellent	fair	excellent

would be useful. FullWrite’s rigid index-formatting style is another strike against it, and opening panel after panel to reformat an index or table of contents is too much work.

EVENT #7: PROGRAM DESIGN AND PERFORMANCE

TESTS: *Quality of documentation; ease of use; program-customizing features; performance; hardware requirements; reliability.*

It’s time to step back from specific features to assess the program’s overall design and the quality of its documentation. In the latter category, Word and WordPerfect finish first. Both include fat manuals containing tutorial sections that walk you through basic tasks, and reference sections organized according to specific tasks. Both also offer excellent online help. FullWrite’s documentation is dismal. The FullWrite Professional Learning Guide lacks a hands-on tutorial, and repeats—often word-for-word—passages from the skimpy reference manual, which is organized according to menu commands. The reference manual lacks a glossary, and many of the typographic and publishing terms used in the

program’s dialog boxes go undefined. FullWrite’s online help screens list some basics and some shortcuts, but aren’t as informative as the other programs’ help screens.

As for ease of learning, FullWrite has the edge. Its basic formatting features are straightforward, thanks largely to its MacWrite-like ruler-to-ruler approach. Word finishes a close second. Its attached-to-paragraph formatting approach can be confusing, but you can get used to it, and remember, it helps make possible Word’s advanced paragraph-spacing and paragraph-breaking options. And beginners can hide Word’s advanced formatting commands by using the program in its short menus mode. WordPerfect is not an easy program to learn, especially if you’ve used any other Mac word processor. However, if you’ve used WordPerfect on a PC and if your Mac has an enhanced keyboard, you’ll catch on quickly: WordPerfect replicates most of its PC cousin’s function key commands.

A program should help novices, but it’s more important that it respond to you once you’ve climbed the learning curve. Here, Word excels. Its myriad keyboard

Event #6 Scorecard
Tables of contents and indexes are important components in large documents. FullWrite’s features for creating them are easier to use than the others’, but are far less flexible. WordPerfect takes this event.

On the Test Track

In most cases, a program's overall design and ease of use are more important than how quickly it performs certain tasks. Still, if you're going to spend a lot of time with a given program, it's helpful to know how much of that time will involve drumming your fingers.

I ran seven tests on each program, on a 2MB Mac II and on a 1MB Mac SE.

■ *Start from Finder.* How long each program took to load. *Winner:* Word.

■ *Open document.* How long each program took to open a 75K file containing several bitmapped graphics and four different fonts. The file's text was double-spaced and filled roughly 43 pages. I created the file in Word, exported it to the other two programs, saved it in each program's native format, and then used the native-format files for the remaining tests. *Winner:* Word.

■ *Save to new file.* The time required to save the 75K file as a new file. With FullWrite and WordPerfect, the results of this test also indicate how long a

standard Save would take.

Word, however, has a Fast Save feature that saves only the edited portions of a document, saving from scratch only after a great deal of editing or reformatting. Thus, a Save command in Word is generally much faster than with FullWrite and WordPerfect. *Winner:* WordPerfect, but remember most saves in Word will be roughly as fast as WordPerfect.

■ *Jump to end of document.* How long each program took to move the cursor from the beginning of the file to the end. With Word and FullWrite, you press the End key to do so. With WordPerfect, you press Enter three times, and then press the down-arrow key. *Winner:* Word.

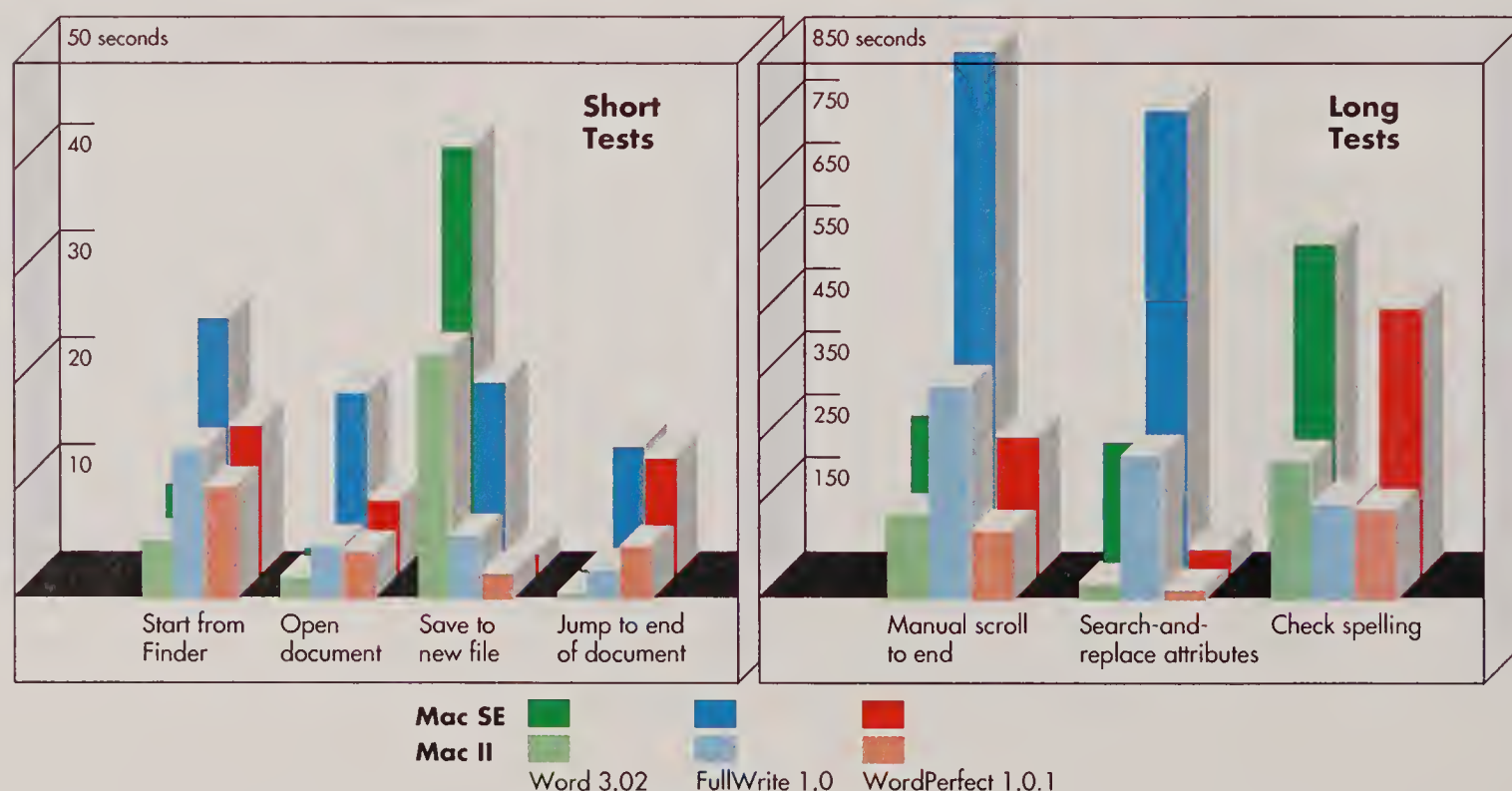
■ *Manual scroll to end.* The time required to scroll through the document by pointing to the vertical scroll bar's down arrow and holding down the mouse button—a real tendon buster. *Winner:* WordPerfect.

■ *Search-and-replace attributes.* How long the programs took to turn all occurrences of

the word *the* (whether within a word or not) from plain text into bold. Word's Change command can't alter text attributes, however, so I changed all occurrences of *the* to three pound signs (###). *Winner:* WordPerfect.

■ *Check spelling.* How long the programs took to run the document through the spelling checker. Each time the spelling checker encountered an unknown word, I told the program to ignore it in the rest of the document. On my 1MB SE, FullWrite bowed out of this event, telling me there wasn't enough memory to perform the operation. *Winner:* WordPerfect.

And the overall performance champion? Based on an averaging of the Mac II results, WordPerfect comes out on top with a time of 41.8. Word finishes second with a time of 58.3. FullWrite, with a time of 107.0, comes in last, hunched over and gasping for breath.



shortcuts and its fast performance make it a responsive writing companion. You can customize Word's menus to show your most-often-used fonts, formats, and documents. FullWrite offers many keyboard shortcuts, too, and its oddly named Walk-Down menu feature lets you choose any menu command from the keyboard. But you can't customize its menus, and direct ⌘-key equivalents for many often-used commands—including Close, Thesaurus, and New Ruler—are missing. Opening and closing panels and sidebar windows can be cumbersome. WordPerfect buries too many commands in submenus, but it's fast and responsive once you master it, and you can customize the keyboard and create macros to automate the formatting and document-management tasks you perform.

Another way for a program to earn its keep is to perform basic tasks quickly. Here, Word and WordPerfect leave FullWrite behind (see "On the Test Track"). FullWrite doesn't *run* on a 1MB SE or Mac Plus; it moseys. If you plan to use this program extensively, consider a memory upgrade and an accelerator board.

Speaking of hardware, Word is the only program of the three that runs on an unenhanced 512K Mac. (Word 4.0 will retain this admirable trait.) WordPerfect runs on a 512KE; FullWrite needs a Plus and a hard disk.

Most important is reliability. Whatever quirks a program might have, it should never crash and take your work with it. In the many hours of work and testing that went into my report, Word 3.02 never did. FullWrite 1.0 crashed a few times and destroyed the report document once. Word-



Event #7: Professional Design and Performance

	Word	FullWrite	WordPerfect
Documentation			
Hands-on tutorial	yes	no	yes
Task-oriented reference guide	yes	no	yes
Quick-reference card	yes	yes	yes
Quality of online help	excellent	fair	excellent
Overall Design			
Ease of learning	easy	very easy	fairly easy
Ease of use	easy	easy	easy
Performance	very good	poor to fair ¹	very good
Reliability	excellent	good	poor
Compatibility with other programs	very good	fair	good
Ability to be customized	very good	poor	very good
Minimum hardware requirements	512K, two 400K drives	1MB, hard disk	512KE, two 800K drives

¹ Basic typing and editing performance is acceptable but most other operations are slow.

Perfect 1.0 crashed regularly. It is not a reliable program for creating complex documents. WordPerfect Corporation has an excellent track record for customer service and support, however, so I'm hopeful that a future version will be more reliable.

The Envelope, Please

So what's the score? I confess that, at the outset, I expected FullWrite to clean Word's clock. That didn't happen. FullWrite has more features, but some are cumbersome, many are gimmicky, and nearly all are slow. All in all, Word wins. True, it lacks FullWrite's drawing features, it can't update a table of contents or index as you work, its revision-tracking talents are sparse, and it's harder to use at times. But it's fast. Its editing and paragraph-formatting features are superior. It formats indexes correctly. And it doesn't take up memory like a sumo wrestler takes up an airplane seat.

Word also has the edge over FullWrite in areas that my report didn't cover. Its mail merge feature, which lets you print "personal" form letters, is more powerful than FullWrite's. Word lets you create and format complex equations (albeit by typing codes that are almost as complex). And far more programs, from outliners to publishers to presentation programs, can directly read its files.

Event #7 Scorecard

Which program is easiest to learn? FullWrite, despite inferior manuals. Which is the most responsive once you've mastered it? Word. Word also has the lightest appetite for hardware, and it can exchange files with more programs.

FullWrite tries to do everything, but no program can. Its drawing features can't replace a drawing program, nor can its page-layout features supplant a desktop publishing program. In day-to-day work, many of FullWrite's features go unused—but they still take their toll on performance and hardware requirements. In short, FullWrite is a flashier program, but Word is a better word processor.

As for WordPerfect, it's very powerful, but it needs more interface polishing and a strong dose of Raid. Version 1.0.1, released in August, fixed many of the bugs I found, but I still can't recommend it, unless perhaps you already use WordPerfect on the IBM PC. But even the ability to exchange files easily and to use the same function key commands may not offset this program's quirkiness.

Word's victory taught me that the best program for the job might not always be the flashiest or even the easiest to learn. You know: don't judge a book by its cover. Or as we say at the Forest Society, you have to see the forest *and* the trees. □

See *Where to Buy* for contact information.

Why Say No to Backup?

Here are 50 drives that can help you recover from a crash.

by Rob Hahn

As you unpack your new hard disk, it's difficult to believe that you'll never again have to deal with floppies. But no matter how careful you are, your hard disk will eventually crash. And in the time-honored tradition, it will crash at the worst possible moment. Trust me. I wish I had \$5 for every person I know who has neglected to back up a hard disk.

Backing up is not fun. But losing critical files can be catastrophic. The best backup solution should offer reliable, fast, convenient, affordable storage of data. So you can rule out another hard disk. Using a hard disk as your sole backup is not a backup solution. That's because the secondary hard disk will never be far away from the primary one—in fact, they're probably attached to the same Mac and online simultaneously. What if the power goes out and both hard disks die? What if a virus contaminates the hard disk? If the backup hard disk gets infected, it's useless. The farther away from your Mac you keep the backed-up data, the better off you are.

Backup Options

Luckily, there are a number of backup solutions now available for the Macintosh that will keep your data safe and secure. Using floppies with backup pro-

Rob Hahn is a Macworld contributing editor, feature-film camera operator, and beta tester. He took his Mac II along on location while shooting Midnight Run.





grams like DiskFit or Redux is the cheapest solution. Unfortunately, floppies have their problems. Although reasonably reliable, they are very slow and hold relatively little data compared with other media. Feeding the Mac disk after disk during backup sessions can frustrate even the most avid backup evangelist.

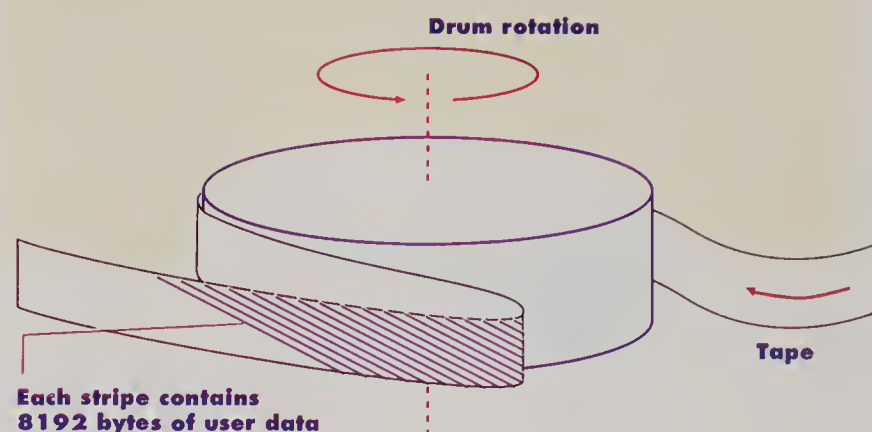
I had a chance to evaluate various alternative backup solutions: tape drives, removable cartridge drives, optical disks, and even 8mm videotape. All were SCSI devices.

I tested each product using a 330-megabyte Priam hard disk filled with 66MB of files. With the removable drives, I used the manufacturer's supplied backup software (if any) as well as DiskFit from SuperMac Technology. After doing a global backup (see "What's a Backup?"), I added a 7MB folder to the Priam and changed a few existing files. I then performed an incremental backup.

Keep in mind that this is an overview of different backup technologies; you won't see every backup product represented here. My tests, however, should give you a general idea of how products within each category perform.

Tape Your Time

Tape cartridge drives have become the most popular form for backup, and there are several good reasons why. Tapes are reasonably inexpensive and physi-



Stripe by Stripe

Helical scan drives are based on magnetic recording (just like conventional tape drives), but they use an innovative approach to put the data on the tape. Minicartridge tape drives record information in parallel tracks that occupy the length of the entire tape. Helical scan drives record information in stripes that run diagonally across the width of the tape, rather than in long tracks. This stripe format allows such drives to store much more data on one cartridge.

What's a Backup?

There are actually two kinds of backup. Backing up all the data on a hard disk is called a *global backup*. Backing up only data that has changed or been added to the hard disk since the last backup (or since a specific date and time you set) is called an *incremental backup*. The best overall backup solution is to do a global backup once a week and an incremental backup every day.

Different backup programs perform globals and incrementals differently. The methods depend on the software you use and sometimes on the storage media as well.

You can use tape to globally back up a hard disk two different ways. *File-by-file* allows you to back up and restore files selectively from a hard disk. You

can back up just one file, several files, or every file on the disk. *Mirror-image* backups copy every sector on a hard disk, making an exact duplicate of the entire disk. This is not always desirable. A mirror-image backup also backs up any flaws on the disk, such as a disk that is badly fragmented.

Applications like DiskFit and Redux reuse space on backups by erasing old versions of files from the backup disks and replacing them with newer versions—taking a “snapshot” of the hard disk at any given time. This method works only with random-access devices like floppies, hard disks, and removable media. The upside is that you don't keep adding disks to the backup set. The downside is that if a hard disk has a virus,

chances are the backup will contract it.

Because tape drives aren't random-access devices, they need another kind of incremental backup software. *Audit trail* backups append incremental backups to the original global backup. Although restoring a hard disk from all those incremental backups isn't as easy to do with tape as it is with random-access devices, you can access older versions of the hard disk because they are never deleted. This kind of backup is good for office environments where it's important to keep old versions of files around for future reference. It is also helpful in case the hard disk gets hit by a virus.

cally small, but they still hold a lot of information—anywhere from 40MB to 300MB. This combination of small physical size and large storage capacity makes tape an ideal solution for storing the contents of a hard disk in a safe place. But there are drawbacks.

With few exceptions, backing up to tapes can be painfully slow (though not as slow as to floppies). Some tape drives let you mount the cartridge on the desktop, just as if it were a hard disk. But you'd be hard-pressed to use a tape drive as a stand-in for a hard disk that's gone into the shop for repair. Tapes are designed for backing up data, not for using backed-up data in real time, so running an application from tape will try your patience.

Tape cartridges come in several different forms. Each type of cartridge has its own particular drive. While you may be able to interchange tapes among similar drives, you won't be able to do so among drives that use different tape formats.

I looked at two drives that use the 40MB DC-2000 QIC (Quarter-Inch Cartridge)—Apple and Tecmar. I also tested an Everex tape drive that uses a 60MB tape made by Teac.

DC-2000

Apple's tape drive has the dubious distinction of being the slowest backup option I looked at. It took over four hours to back up 66MB. Most tape drives copy files to the tape at high speed, without stopping and usually without verification, a process called *streaming*. Apple's drive doesn't stream. As a result, the speed of this unit is not really competitive.

On the other hand, Apple's drive was one of the most reliable tape drives I tested. When it writes data, it does so in 8K blocks. Each 8K block is broken up into two 4K blocks. A third block, containing data from

both the 4K blocks, is written as well. If you ever lose information from one of the 4K blocks, you can reconstruct it from this third block.

Tecmar offers a reasonably fast 40MB DC-2000 tape drive in a nice small package. It has the best software of the bunch; using MultiFinder, you can back up or format tapes in the background with little or no degradation. You can also format Apple-compatible tapes (which use a 2:1 interleave) in addition to Tecmar's normal 1:1 interleave tapes.

Interleaving refers to how many sectors a tape skips when it reads or writes information. It allows manufacturers to compensate for differences between a drive's transfer rate and the Mac's SCSI-port transfer rate. (For more information on interleaving, see "The Disk Shopper's Guide to Storage," *Macworld*, December 1987.)

I can't confirm that a Tecmar "Apple-compatible" formatted tape will always read properly in an Apple drive. The first time I tried to restore a hard disk using Tecmar's Apple-compatible tape in an Apple drive, it didn't work. I had to reformat the tape and try the whole process again.

Nor was I able to restore my hard disk from a Tecmar mirror-image backup, with a tape formatted in Tecmar's 1:1 interleave, using Tecmar's drive. To date there hasn't been a fix. According to Tecmar, this error occurs only on a mirror-image restore, and may occur only with very large volumes. File-by-file backups and restores worked for me without a hitch.

Teac Tape

The Teac-based systems are generally much faster than the DC-2000 systems. Another advantage is that each Teac tape (which is the size of an audiocassette) holds 60MB of data instead of 40MB, as DC-2000 car-

The Totem II, from Bering Industries (with Bernoulli cartridge in foreground); the MegaDrive 20 from Jasmine Technologies; and Mass Micro Systems' Data Pak.



Tapes

Manufacturer	Product	Type of Tape	Capacity per Unformatted Tape	Price
ADIC	APL-40T	DC-2000	40MB	\$1495
Alpha Micro	Videotrax	VHS, Beta, 8mm videotape	80MB–240MB, depending on length of tape	499 [†]
Apple	Apple Tape Backup 40 SC	DC-2000	40MB	\$1499
Blackhole Technology	MacTape/SCSI	1/2 inch 9-track reel-to-reel	160MB	\$10,500
CMS Enhancements	TapeStack	CT-600H	60MB	\$995
Everex	EMAC-60T	CT-600H	60MB	\$1395
First Class Peripherals	The Sider T6	CT-600H	60MB	\$895
General Computer	HyperTape	DC-2000	40MB	\$1399
Genius	2Gig	8mm videotape	2.3 gigabytes	\$4995
Giga Cell Systems	DataFile 40	DC-2000	40MB	\$1225
Giga Cell Systems	DataFile 150	DC-600	150MB	\$2070
IBNC	IBNC 60MB tape drives	CT-600H	60MB	\$850
Irwin Magnetics	5040	DC-2000	40MB	\$1395
Irwin Magnetics	5080	DC-2000	80MB	\$1695
Jasmine	DirectTape	DC-2000	40MB	\$1099
Laser Optical Technology	LD-T50	CT-500H	50MB	\$1095
Laser Optical Technology	LD-T60	CT-600H	60MB	\$1115
MacPeak Systems	ST-60	CT-600H	60MB	\$1095
MacPeak Systems	ST-150	CT-1200H	150MB	\$1595
Micah Storage Systems	XTP 40	DC-2000	40MB	\$999
Micah Storage Systems	XTP 60	CT-600H	60MB	\$999
Microtech	Nova T60	CT-600H	60MB	\$899
NovaStor	NST150	DC-600	150MB	\$2495
NovaStor	MacStreamer	1/2 inch 9-track reel-to-reel	130MB	\$3995
PCPC	PCPC Tape Backup	8mm videotape	256MB–2048MB, depending on length of tape	\$4995
Peripheral Land	MacBack 60	CT-600H	60MB	\$1295
Qualstar	Ministreamer Model 1054	1/2 inch 9-track reel-to-reel	130MB	\$3995
Qualstar	Ministreamer Model 1260S	1/2 inch 9-track reel-to-reel	250MB	\$7995
Relax Technology	Tape 60 Plus	CT-600H	60MB	\$995
Spectra Micro	Spectra 60	CT-600H	60MB	\$795
SuperMac	DataStream	DC-2000	40MB	\$1295
Tallgrass	TG-4040	DC-2000	40MB	\$1195
Tecmar	QT-Mac40	DC-2000	40MB	\$1395

*Contact vendor for specific information on warranties.

[†]Removing termination requires opening up drive.

[‡]\$499 includes only controller and software for use with any VCR; computer-controlled VCR subsystem available for \$1299.

[§]Drive has only one DB-25 pin connector; T-type connector necessary for daisy-chaining.

[¶]Thirty-day money-back guarantee.

Warranty	Service	Included SCSI Cables	Comments
1 year	toll-free phone support	DB25-DB50	internally terminated [†] ; compatible with Apple tape drive
1 year	toll-free phone support	terminator only	can also be used to broadcast data over television systems
90 days	authorized dealer	none	externally terminated
1 year	toll-free phone support	all cables and terminator	can be used to transfer data with minicomputers and mainframe computers
1 year	phone support	all cables and terminator	externally terminated
1 year	authorized dealer	all cables	externally terminated
1 year	phone support; authorized dealer	DB25-DB25 SCSI; terminator	externally terminated
1 year	phone support; authorized dealer	DB25-DB50; terminator	externally terminated
n/a	n/a	n/a	internally terminated [†]
1 year	toll-free phone support	DB50-DB50 or DB25-DB50	externally terminated; can read Apple tape drive tapes but can't write to them
1 year	toll-free phone support	DB50-DB50 or DB25-DB50	externally terminated
1 year	phone support	DB25-DB25	internally terminated [†]
1 year	toll-free phone support	none	externally terminated; uses Irwin's Accutrak nonstandard recording format data interchange with MS-DOS, AIX, A/UX, OS/2 computers; network-wide backup possible
1 year	toll-free phone support; 48-hour exchange, in or out of warranty	none	externally terminated; uses Irwin's Accutrak nonstandard recording format; data interchange with MS-DOS, AIX, A/UX, OS/2 computers; network-wide backup possible
2 years	phone support	all cables [§]	externally terminated; compatible Apple tape drive
90 days	phone support	n/a	internally terminated [†]
90 days	phone support	n/a	internally terminated [†]
1 year	toll-free phone support; 48-hour turnaround service	DB50-DB50 or DB25-DB50	internally terminated [†]
1 year	toll-free phone support; 48-hour turnaround service	DB50-DB50 or DB25-DB50	internally terminated [†]
2 years	toll-free phone support	DB50-DB50 or DB25-DB50	internally terminated [†]
2 years	toll-free phone support	DB50-DB50 or DB25-DB50	internally terminated [†]
2 years	toll-free phone support	DB50-DB50 or DB25-DB50	externally terminated
1 year	phone support	DB25-DB50	internally terminated [†]
1 year	phone support	DB25-DB50	can be used to transfer data with minicomputers and mainframe computers
1 year	phone support; authorized dealer	DB25-DB50	internally terminated [†]
1 year	phone support	none	internally terminated [†]
90 days	phone support	DB50-DB50 or DB25-DB50	can be used to transfer data with minicomputers and mainframe computers
90 days	phone support	DB50-DB50 or DB25-DB50	can be used to transfer data with minicomputers and mainframe computers
1 year	toll-free phone support; 48-hour turnaround service	DB25-DB25	internally terminated [†]
1 year	phone support; authorized dealer	DB25-DB25	internally terminated [†]
1 year	phone support	DB25-DB50	internally terminated [†] ; compatible Apple tape drive
3 years	authorized dealer	DB50-DB50 or DB25-DB50	externally terminated
2 years	toll-free phone support; 48-hour turnaround service for first 6 months	n/a [§]	externally terminated; compatible Apple tape drive

Removable Storage

Manufacturer	Product	Type of Drive	Price	Capacity (per unfor- matted disk/ cartridge)	Price (per disk/ cartridge)	Average Access Time
ADIC	APL-800WD	WORM (write-once, read-many) optical drive	\$4995	800MB (400MB per side)	\$150	100 ms
Bering	Totem II	Bernoulli removable media	\$1195	20MB	\$85	37 ms
DPI	44 removable	Winchester removable hard disk	\$1795	45MB	\$129	25 ms
Giga Cell Systems	FlexiDrive 10	high-density floppy	\$1495	10MB	\$55.95	65 ms
Giga Cell Systems	DataWorm	WORM (write-once, read-many) optical drive	\$5525	800MB (400MB per side)	\$279	108 ms
Iomega Corporation	Bernoulli Box II	Bernoulli removable media (5¼ in.)	\$2550	20MB	\$83	40 ms
Iomega Corporation	Bernoulli Box II	Bernoulli removable media (5¼ in.)	\$1650	20MB	\$83	40 ms
Jasmine	MegaDrive 10	removable cartridge	\$699	10MB	\$39.95	65 ms
Jasmine	MegaDrive 20	removable cartridge	\$999	20MB	n/a	60 ms
Laser Optical Technology	800MB WORM	WORM (write-once, read-many) optical drive	\$3995	800MB (400MB per side)	\$200	100 ms
Mass Micro	Data Pak	Winchester removable hard disk	\$1775	45MB	\$125	25 ms
MicroDynamics	MicroDynamics Mars	WORM (write-once, read-many) Sony optical drive system	\$19,000	3.2 gigabytes	\$360	190 ms
MicroDynamics	MicroDynamics Mars	WORM (write-once, read-many) LMSI optical drive system	\$14,000	2 gigabytes	\$500	150 ms
Mirror Technologies	Mirror 20MB removable	removable cartridge	\$995	24MB	n/a	60 ms
Peripheral Land	Infinity 10	high-density floppy	\$1395	10MB	\$32 (preformatted) \$25 (unformatted)	65 ms
Peripheral Land	Infinity 40 Turbo	Winchester removable hard disk	\$1795	40MB	\$169	25 ms

* Contact vendors for specific information on warranties.

† Removing termination requires opening drive.

‡ 30-day money-back guarantee.

Mean Time Between Failures	Media Shelf Life	Included SCSI Cables	Warranty*	Service	Comments
30,000 hours	10 years	DB25–DB50	1 year	phone support	internally terminated [†]
5000 hours	5 years	DB25–DB50	1 year	5-day turnaround service, plus shipping time (loaners may be available)	1:1 interleave; externally terminated
15,000 hours		none	1 year	24-hour turnaround service; toll-free phone support	user-configurable 1:1, 2:1, 3:1 interleave; internally terminated [†]
10,000 hours	n/a	DB50–DB50 or DB25–DB50	1 year	toll-free phone support	1:1 interleave; externally terminated
30,000 hours	1 year	DB50–DB50 or DB25–DB50	1 year	toll-free phone support	1:1 interleave; externally terminated
n/a	10–20 years	DB25–DB50	1 year	phone support; authorized dealer	dual-drive configuration; internally terminated [†] ; Bernoulli cartridges
n/a	10–20 years	DB25–DB50	1 year	phone support; authorized dealer	single-drive configuration; internally terminated [†] ; Bernoulli cartridges
10,000 hours	lifetime warranty	DB25–DB50	2 years [‡]	9 a.m.–6 p.m. phone support	1:1 interleave; internally terminated [†]
10,000 hours	lifetime warranty	DB25–DB50	2 years [‡]	9 a.m.–6 p.m. phone support	
20,000 hours	30 years	DB25–DB50	90 days	From LOT; also dealer	1:1 interleave; externally terminated
20,000 hours	7 years (10,000 insertions)	DB25–DB50	1 year [‡]	24-hour phone hotline; service contracts available	1:1 interleave; internally terminated [†]
10,000 hours	100 years	none	6 months from Sony	phone support; Sony services drives	multiuser network server for image processing system
12,000 hours	30 years	none	6 months from LMSI	phone support; Control Data services drives	multiuser network server for image processing system
10,000 hours	n/a	n/a	1 year [‡]	toll-free phone support	3:1 interleave; internally terminated [†]
10,000 hours	n/a	DB25–DB50	1 year	phone support	internally terminated [†] ; can read IBM 5¼ in. 360K and 1.2MB floppies for data exchange
15,000 hours	7 years (10,000 insertions)	DB25–DB50	1 year	phone support	internally terminated [†] ; dynamic caching software utility included

tridges do. Everex's drive is ideal for doing global backups because it is fast: it took me about 20 minutes to back up 66MB.

Incremental backups, however, are another story. The big problem? You can't append to an existing tape. To do an incremental backup of only 3MB, you have to use an entire 60MB tape.

Nuvo Labs, which writes the backup software bundled with the Everex drive, says that a new version of its software should correct this problem. The new software should also address another problem with the Everex's drive setup, namely files and folders not being placed in their proper positions after a restore.

I also had two additional problems with the tape drive. First, when a 7MB folder was copied to the hard disk, the files inside weren't automatically tagged as needing backup. As a result, none of the files were included in the incremental backup. Second, the Everex drive intermittently caused all globally restored applications, when launched, to give me the "Busy or missing application" dialog box. Everex couldn't reproduce

the problem, though, and thought it might have been related to the large hard disk I was using.

Taking It with You

Imagine having a huge floppy on which to back up a hard disk, and you'll know what it's like to own a removable-cartridge drive. Encased in a hard shell, a removable cartridge measures about 5¼ inches—the size of an old IBM floppy, but thicker. The beauty of these systems is that you can use them like a temporary hard disk if your regular hard disk goes in for service. Unlike tape drives, removable cartridge drives are random-access devices and can be mounted on the desktop just like a floppy (see "Drivers Explained").

I tested three removable units: Jasmine's MegaDrive (the 10MB version), Bering's Totem II, and Mass Micro's 45MB removable cartridge drive.

High-Density Floppies and Bernoullis

The MegaDrive works just like a regular floppy, with its drive heads touching the media. Because it

Drivers Explained

How does your Mac recognize a hard disk, a floppy, or a removable disk? It's all in the *drivers*. A driver is a piece of code that tells the Mac specific information about a volume, how that volume should behave, and how to treat that volume when it gets mounted. Whenever you format a floppy or a hard disk, you permanently write a driver to a reserved track on that floppy or hard disk.

When you first start the Mac, the system examines all disk drives connected to it and looks for inserted disks. If there are any, the Mac finds the driver located in that special reserved track and loads the driver into memory. This procedure is the same for floppies, hard disks, or removables. (Hard disks are always on when you start up, so as far as the system is concerned, the hard disk is already "inserted.")

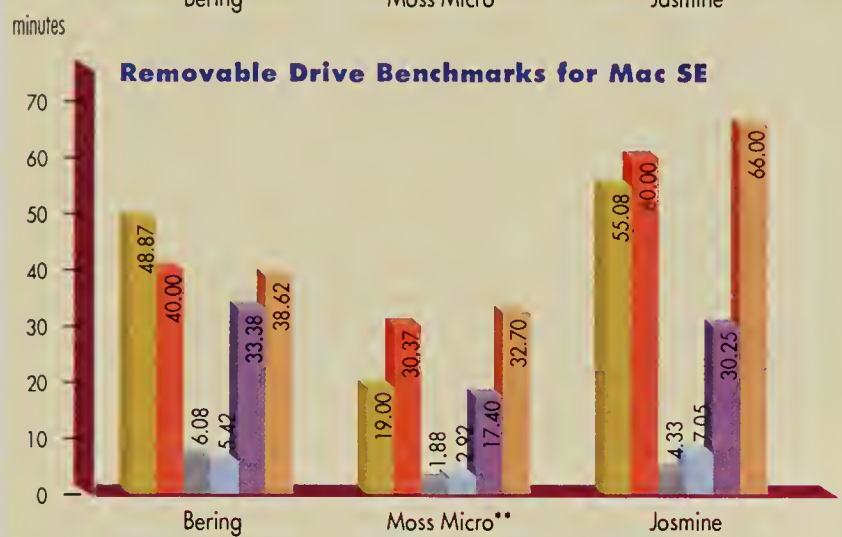
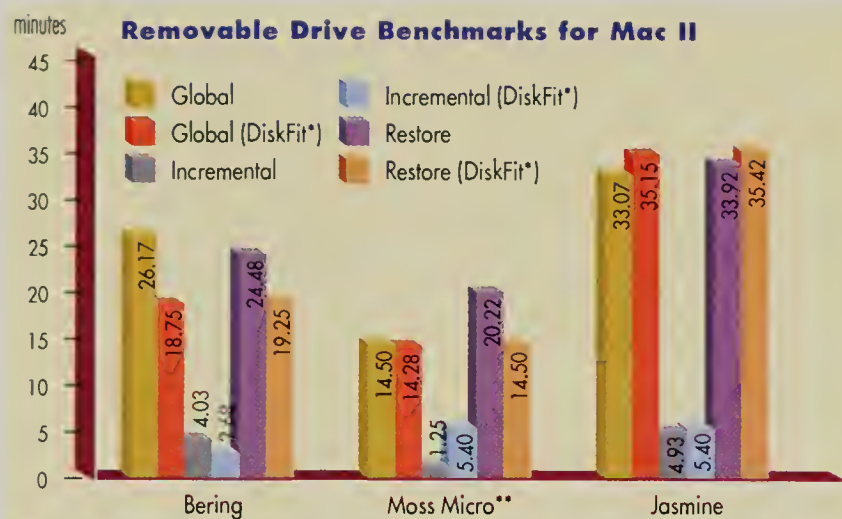
Once the Mac recognizes the volume, the system can properly mount the disk on the desktop. But what about disks that aren't inserted until after you start the Mac? Remember, the system is only instructed to get a driver and copy it to memory at start-up.

For floppies, Apple built a watchdog (located in the *read-only memory*, or ROM) that instructs the system to check constantly for a floppy insertion. When one occurs, the system loads the driver into memory just as it would at start-up. That's why a floppy appears on the desktop whenever you insert a floppy into a drive.

On the other hand, there isn't a watchdog in the Macintosh ROM for a removable hard disk. If you insert the cartridge after start-up, the Mac simply ignores it; it hasn't the foggiest idea, for example, what a Mass Micro 45MB removable cartridge is.

That's where an INIT comes in. The INIT (which gets temporarily copied into memory at start-up) tells the system to recognize and look for not only floppies but also removable hard disks. As a result, the system—because of the INIT—instantly knows what a cartridge is when you insert it after start-up. Then the Mac can get the driver and mount the 45MB cartridge.

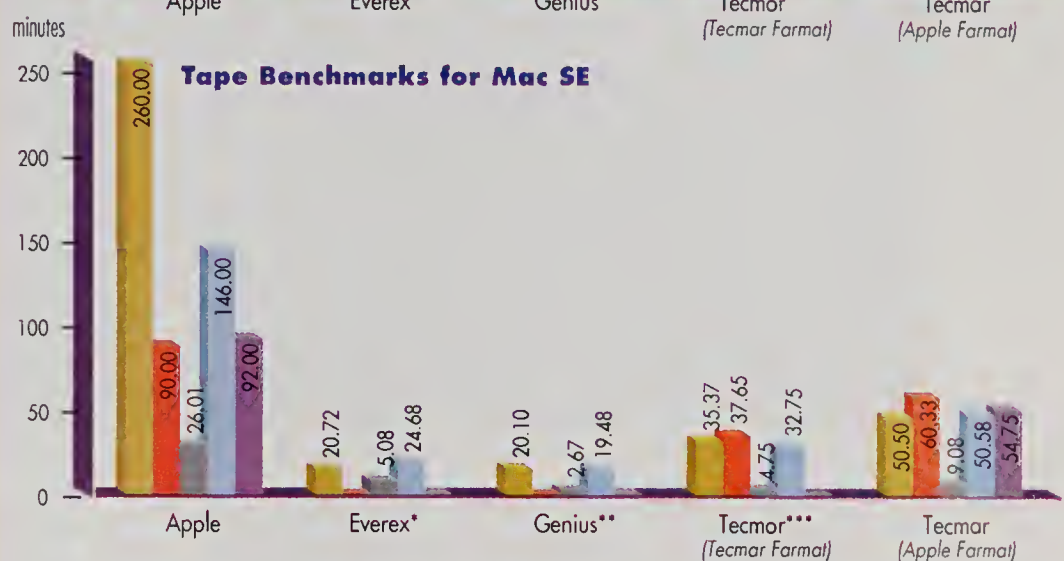
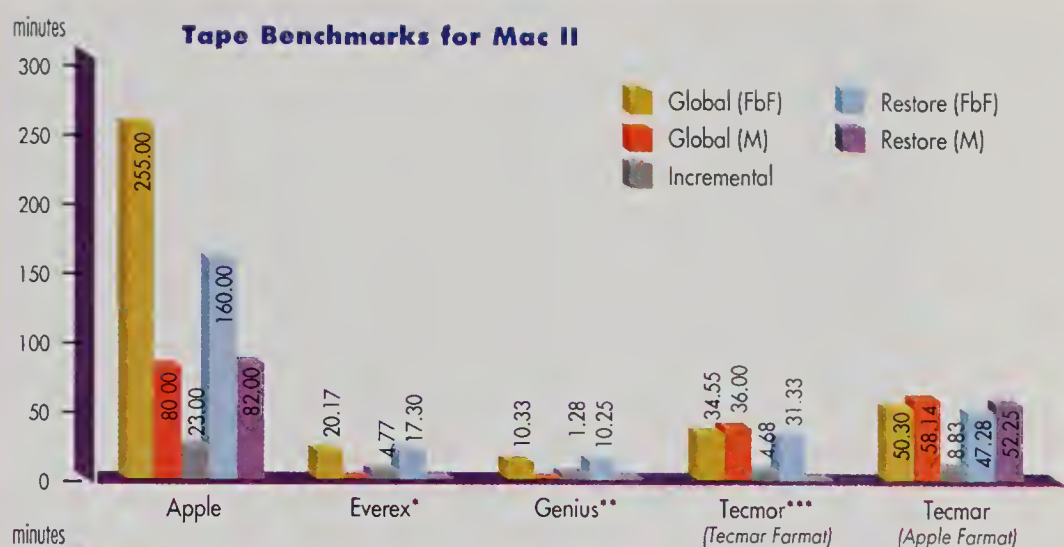
Except for floppies, most removable media—Bernoullis, MegaDrives, 45MB cartridges, even CD ROMs—use watchdog INITS. (Floppies don't have to, because they already have special recognition from Apple's ROM.) Other types of removable media don't get recognition from Apple's ROM, so they need INITS. It's nice when you give the party: you have control over whom you invite.



Global backups were performed on a 330MB Priam hard disk. There were 2548 files on the Priam, for a total of 65,905K of data. Incremental backups were performed after adding a 7MB folder to the Priam and changing some MacWrite and Word files on the hard disk. All removable drive backup benchmarks were performed with 92K of RAM cache.

*DiskFit benchmarks performed with Faster Copying and Verify Writes selected.

**Global benchmarks for Mass Micro removable drive performed with the drive's bundled backup software, do not include write verification.



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*Mirror backup and restore not performed on a 330MB disk because software wanted to back up the entire disk, not just the 66MB of data. Mirror backup performed for a 40MB hard disk had no problems.

**Benchmark times include write verification. (Benchmark times performed for Apple, Everex, and Tecmar tape drives do not include write verification.) Mirror backups and restores are inapplicable with Genius drive.

***Drive could not complete mirror restore.

doesn't come with an external SCSI terminator, you have to open the drive and fiddle with a bunch of small resistors. Although the MegaDrive is fairly inexpensive compared to the other removable cartridge drives, it's slower than even the Tecmar tape drive. And though the drive is bundled with the superb Redux software, the cartridges are relatively expensive—one MegaDrive cartridge holds just 9.5MB and costs \$40.

The Totem, which is a Bernoulli-type drive, works by floating its drive heads over sectors, picking up data via electrically charged particles; the heads never touch the media's surface. The drive runs at speeds comparable to Everex's tape drive and uses 20MB car-

tridges that cost \$85 apiece. I was confused by Bering's backup software—it has a nonintuitive interface with virtually incomprehensible online help. I suggest you buy DiskFit or Redux. I also found some problems when I tried using a Totem cartridge as a start-up disk; if there's another System on a connected hard disk, the drive can't get started in time to boot from the cartridge. A phone call to Bering confirmed this problem.

Removable Hard Disks

The Mass Micro 45MB cartridge is actually a removable Winchester hard disk. When you insert a cartridge, air blasts the medium, creating positive air pressure in the chamber that houses the medium. Pressure (caused by the centrifugal force of the rotating disk) blows all particles off the medium. Air is then

filtered as it comes into the drive. The medium itself is plated with a hard carbon overcoat that prevents anything from sticking to it.

Mass Micro, Peripheral Land, and DPI are currently the only manufacturers of 45MB removable drives for the Mac. All use the same drive mechanism, so they can read each other's disks. The primary difference is in packaging and software. For example, Mass Micro uses an INIT to let the Mac "know" about its cartridge, while Peripheral Land doesn't. That means you must have a Peripheral Land cartridge in the drive at boot time, or it won't show up on the desktop if you later insert a cartridge.

The 45MB removables were among the fastest backup solutions I tested. In fact, they're so fast that it is tempting to use them as hard disks—which is what they are. You can do this, of course, but then you'll have to find a backup solution for them.

If you can restrain yourself and use the 45-megs as backup devices only, you will be overjoyed at how painless backing up can be. They offer the ultimate in flexibility, speed, and reliability, albeit at a relatively steep price for the drive. At the same time, the medium offers better value for your money (\$125 per cartridge) than the MegaDrive or the Totem cartridges.

Because 45MB removables are so fast, doing incrementals every night is a breeze. And because of their data capacity, you don't have to baby-sit these drives so much during backups. Two cartridges will hold an 80MB hard disk; that's one disk swap—sure better than shoving in 98 floppies.

There has been some concern over the reliability of removable media—with some justification. Syquest, the company that manufactures the 45MB cartridges, has had a shaky past in the IBM world. However, Sy-

quest seems to have solved its production problems; I've had good luck with the many cartridges I've been using. Bernoulli cartridges have also had some reliability problems. Some users claim that, over time, sectors go bad just sitting on the shelf. These problems also seem to have been solved. And although Jasmine has enhanced its software's error-correction technology, and Verbatim (which makes the MegaDrive cartridges) has improved the media, some users report that Megafloppies have been fairly unreliable.

The Future Is Here

I had a chance to peruse the latest in backup storage technology: Laser Optical Technology's WORM (write-once, read-many) optical drive and Genius's 8mm videotape backup system. AlphaMicro's VideoTrax, which uses a regular VHS recorder and VHS tape to back up 80MB, was not ready at the time of this writing.

WORM drives use lasers to etch data permanently onto nonerasable disks; once you back up data to a WORM, it's there for good. The cartridge I tested held 800MB, 400MB on each side. Since I could back up only the entire mirror image—all 330MB—of my hard disk, the benchmarks are not really applicable here. However, you should know that it took a little under five hours to back up my Priam filled with only 66MB. Needless to say, at this time I can't recommend this WORM drive for daily backups, although it has enormous utility for archiving permanent data.

Genius's 2Gig 8mm video tape drive is another story. Along with the 45MB removables, it was the fastest backup solution I looked at. Using a regular 8mm videotape (\$8), I backed up my 66MB hard disk in ten minutes (that includes verifying the writes). Theo-

Laser Optical Technology's WORM-800, and Custom Memory Systems' CM-45 (no longer available), and a 45MB cartridge.



EMAC-60T, by Everex; QT Mac 40, from Tecmar; the Apple Tape Backup 40SC; the 2Gig, from Genius; and a DC-2000 tape cartridge.



retically, if the drive didn't have to use the Mac SCSI port, it could transfer data at a whopping 15MB per minute.

Tape capacity is a strong point, too. One 120mm videotape can hold 2.3 gigabytes of data—equal to 2300MB. Needless to say, I hope Apple is looking into this technology.

What about digital audio tape (DAT)? DAT and 8mm videotape both use helical scan technology to read and write data (see "Stripe by Stripe"). The difference is that DAT is only 4mm wide. It is half as fast as 8mm, holds half the capacity, and is much less expensive. Can you say *laptop*, boys and girls?

A Question of Speed

Benchmarks can be deceiving because they usually don't show the whole picture. If backups take too long, though, you simply won't take the time to archive your data, so in this case benchmarks are helpful.

Because of the way they work, tape drives aren't usually affected by the processor speed or the Mac interleave factor. In most cases more memory helps, but generally the tape devices just "stream away" at their own rate. On the other hand, the performance of random-access devices—the 45MB removables and the Bernoullis—is very much affected by processor speed and interleave. For example, the Tecmar and a 45MB removable take about the same time to back up 66MB on the SE; on a Mac II, however, a removable unit beats the Tecmar.

When comparing benchmarks, you should also take into account whether or not the writing of data to the backup is being verified. A Mac SE with an Everex drive actually takes less time (20 minutes) to back up a

hard disk than does a 45MB removable using DiskFit (30 minutes), but DiskFit's 30-minute time includes verifying writes, and the Everex's 20-minute time doesn't. If you could verify the data with the Everex, DiskFit and the removable would be faster.

Back to Earth

With the advent of larger capacity disks, every computer will need a built-in backup solution. The DC-2000 and Teac tape systems are acceptable for low-capacity hard disks, but they won't cut it in a world of erasable, optical, gigabyte storage devices. And that world is closer than you think.

One thing's certain: backing up is drudgery, plain and simple. But it is a necessary evil. I must say I was very disappointed in general with tape drives; none of them offered an efficient backup solution, especially for incremental backups. Almost all the software has problems in some respects, especially when performing incremental backups, and the drives (except for the 8mm) are too slow. No matter how nifty a product is or promises to be, if it ain't easy and fast, you won't bother to back up. Period.

For convenience, flexibility, and speed, the 45MB removable is the clear winner. For global backups, the 8mm tape is the future and you can buy it today. If money is a limitation, any of the Teac systems will do. For the user of small-capacity hard disks (10MB to 40MB), a DC-2000 unit like Tecmar's has a lot going for it. □

See *Where to Buy* for contact information.

Reviews

FileMaker II

File-management program. **Pros:** Superior flat-file performance; simple networking on AppleTalk or file servers; templates for most common uses. **Cons:** None. **Company:** Claris Corporation. **List price:** \$299, \$599 for four-user network system. **Requires:** 1MB, two 800K drives; hard disk recommended.

One of the best-selling Macintosh flat-file managers, Nashoba's FileMaker Plus incorporated an impressive set of virtues. This forthright approach continues in the upgraded version, FileMaker II (now marketed by Claris). If your database needs don't absolutely demand a relational structure (automated posting in accounts and multiple-linked files are examples of applications that do demand it), FileMaker II is your best choice. FileMaker II's networking capabilities further increase its scope so that it can handle the tasks facing most midsize businesses.

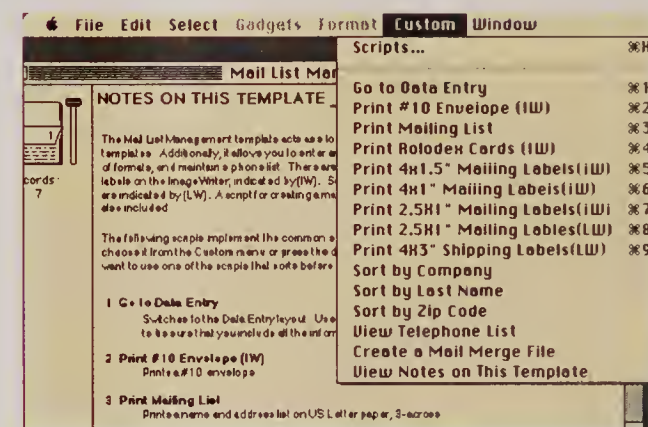
Distinguished Ancestry

Since the main differences between FileMaker II and FileMaker Plus are the addition of networking capabilities and an upgrade of standard features, it's worth re-

viewing the points that make FileMaker, in any incarnation, a solid product.

First, it's fast. Since this program indexes all possible fields—it does this as a background task—FileMaker offers the fastest searches and sorts in its class (see "Data Basics," *Macworld*, June 1988). Second, its files (and records and fields and field sizes) are limited only by disk space. This means that you can attach long text fields to data records, which is often helpful for storing client notes or inventory descriptions. Third, FileMaker aims to please. The documentation is clear, it comes in a convenient book format, the tutorial is easy to follow, and there are templates for ten standard business/organization applications. The program offers a respectable set of tools for designing forms (called layouts) for use in data entry, reporting, or viewing file contents.

Nice small touches, such as keyboard shortcuts, and large touches, especially an autosave feature, make FileMaker a favorite for day-to-day use. A lookup feature enables you to pull data from other files into your currently opened file automatically, according to specified criteria. While this feature works somewhat like a key field in a relational database, FileMaker is not a relational database. If you want to set up a



Play It Again

This example of script choices under the new Custom menu not only demonstrates the facility but also shows FileMaker II's prodigious attempts to anticipate most organizational needs (this example comes from the prepared Mailing List templates).

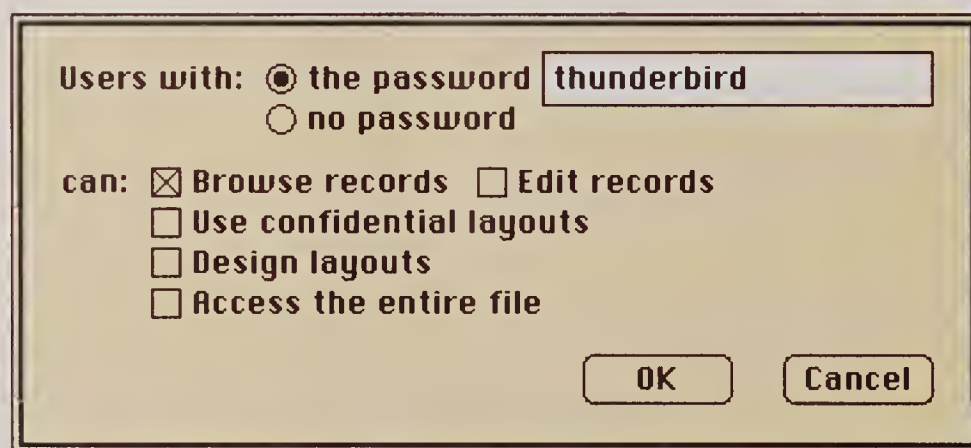
full-featured accounting system that will serve several connected branch offices, or set up manufacturing inventories that will track different stages of partially finished goods, you'll need to step up in power (see "A Full House," *Macworld*, October 1988). But for small businesses, FileMaker's streamlined lookup, managed through dialog boxes rather than a programming language, may be all the file-to-file relational connection you need.

Three Points about II

Although FileMaker II provides many improvements that make designing layouts more convenient, adds a file-compression

What's the Word?

The only password scheme simpler than FileMaker II's is the one used in Cub Scout troops. Still, FileMaker II's security system keeps out unauthorized users. Access levels can be set using this basic dialog box.



option, and reorganizes font and style choices into hierarchical menus, the three biggest performance-oriented additions are networking, automated scripts, and data field characteristics.

As database application developers often remark, multiuser capability really means the ability to have several people slogging away at data entry at once. FileMaker II assumes that you will be sharing files—when you toggle off the Exclusive menu item on the current work file, you grant access to multiple users. In business applications, as soon as you have multiple users you need to worry about data integrity, so FileMaker II offers a simple password scheme in which you set passwords and access levels from a dialog box (see “What’s the Word?”). As the *host* (the first person to open a file in a work session) you must open lookup files associated with the work file. And when using MultiFinder, the host must be careful to run only applications that support background processing. Other than those caveats, there are no special precautions—FileMaker II automatically performs updates and modifications across a network.

With a file server such as TOPS or AppleShare, FileMaker II can be *multi-launched*, meaning that more than one person can use a single copy of the FileMaker II application simultaneously on a network. In this case, FileMaker II is installed either on a Macintosh used as a file server or on a TOPS-equipped Mac. However, with the street price of a four-user FileMaker II system running between three and four hundred dollars, you may find it makes better economic sense to get the full system rather than suffer the performance degradation associated with multilaunch mode.

FileMaker Plus had a scripting facility, but it was buried in the File menu and given a mere four pages of documentation. In FileMaker II, the new Custom menu item is used for quick access to named scripts, and documentation and examples have both been augmented (see “Play It Again”). Since scripting works in record mode directly from keystrokes and requires no programming, scripting’s new prominence in the FileMaker menu may encourage beginners to automate a few common sequences and may inspire advanced users to develop libraries of scripts.

Finally, database field capabilities have been enhanced. Users can now specify data entry options that force field data to match a list of values or to fit within a user-specified range of values. Summary fields (fields used to produce totals or other computations from numerical data in a

specified set of records) now include new types of total, subtotal, and average, thus streamlining report production. Field-type conversions (text to numeric, date to text, and others) are also supported.

Summary

FileMaker Plus was already at the head of its product class. FileMaker II now offers networking and an assortment of major and minor improvements, many of them user-suggested, without compromising the original program’s simplicity and ease of learning. It’s easy to see why Claris wanted to acquire this product, and you should think seriously about FileMaker II if you have files to manage.—Charles Seiter

See *Where to Buy* for contact information.



MacDraw II

Object-oriented draw program. **Pros:** Ingenious features simplify drawing; redraw is twice as fast as original MacDraw's; very customizable. **Cons:** Limited number of drawing tools; user must create color patterns. **Company:** Claris Corporation. **List price:** \$395. **Requires:** 1MB.



You've probably heard the standard equivocation about a prospective blind date's looks: "He's/she's got a great personality." Well, MacDraw II also is a joy to spend time with even though it lacks some of the sexier features found in other draw programs. Although MacDraw II does not have Cricket Draw's special effects, MacDraw's measurement functions, or SuperPaint's dual paint and draw layers, the program incorporates an extensive list of features, many of which make it so easy to use that other draw programs, including MacDraw, seem stilted by comparison.

MacDraw II has most of the standard features that are lacking in MacDraw. For example, you can set pen sizes from 1½ inches to 1/10,000 of an inch. You can use 256 pen sizes on a page, and you can customize arrows and dashed lines. Font sizes and line spacing range from 1 to 127 points. Dif-



ferent styles and sizes of text can coexist in the same paragraph. And you can create an unlimited number of fill patterns.

MacDraw II also offers all of the standard control functions found in other draw programs. In addition, you can rotate objects in increments of 1/100 degree, rather than just flipping them 90 degrees as in MacDraw. You can zoom in up to 32 times (the enlargement percent doubles each time) and zoom out till the page takes up just 3 percent of the screen. Rulers are also customizable.

Pleasant Surprises

While people now expect many of these features to be in a drawing program, MacDraw II adds a number of pleasant surprises. For example, some draw programs automatically deselect tools after each use; in others, tools remain active until you deselect them. With MacDraw II, you choose whether tools automatically become deselected or remain active by either single- or double-clicking on the tool's icon. It's also easy to select objects in MacDraw II. For example, to select all instances of one kind of object, say every rectangle, you click on the rectangle tool and choose Select All. And if you hold down the ⌘ key while drawing a selection box, MacDraw II selects any object that the box touches, rather than just those contained within the box.

A number of features make creating and editing a drawing easier. For example, MacDraw II automatically draws lines at almost any user-specified angle. When editing stacked objects, you're not limited to sending all objects to the back or front; you

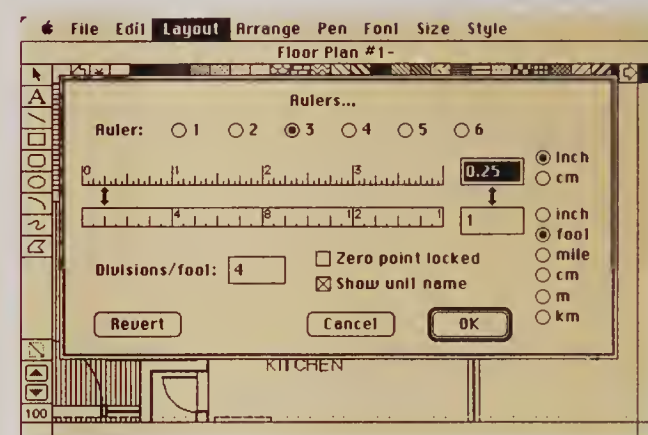
can send them backward or forward one at a time. The program can also automatically distribute objects evenly across a page.

MacDraw II makes navigating around large documents easy because it lets you specify up to nine views of a document. Each view defines not only a portion of the document but also a zoom percentage, a ruler type, and other settings.

Although you can't change the default values in MacDraw II, you can create Stationery documents that contain settings or graphics, such as a logo, that you want to reuse. A Stationery file differs from regular files in that each time you use it, the program forces you to save the changes as a document with a new name. That way the Stationery settings are protected.

Some Larger Features

Two major features increase efficiency. The Library offers a handy way to store and access clip art. In most programs, you paste

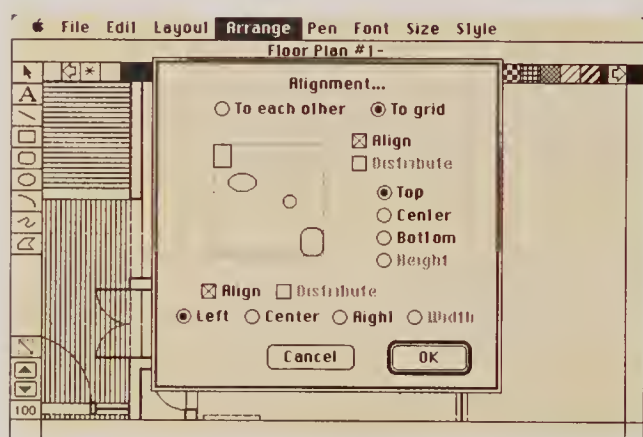


Specifying Scale

The Rulers dialog box lets you specify a drawing scale. Six preset scales range from 1 inch = 1 inch to 1/4 inch = 1 foot. But you can create custom scales. You can also specify the number of divisions per unit. Changing the scale has no effect on objects already drawn, so you can use different scales within the same document. When pasting an object, you can force it to convert to the scale in effect when it is pasted.

clip art into a document from another file. If that file contains a lot of clip art, however, it can take you a while to find the objects you want. With MacDraw II you can give an object a library name such as "logo," "counter top," or "window." When you want to retrieve the object, you open the document using the Open as Library menu option. MacDraw II then displays a

(continues)



Aligning and Distributing Objects

The Alignment dialog box allows you to align objects to each other or to a grid, and to distribute objects equally across a page. You can align objects so that their tops, centers, or bottoms align either vertically or horizontally. You can also distribute objects vertically or horizontally, by height or width. The Alignment box shows a pictorial representation of the alignment you choose.

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window with all of the library names in alphabetical order. When you click on a name, a 2-inch-square picture of the object appears. You can then copy the object from the library window and paste it into another document; MacDraw II can rescale an object to match the current ruler settings.

A second important feature is layers that work much like acetate overlays. MacDraw II enables you to create, display, hide, rearrange, or print any combination of layers. Although you can draw only on the active layer, you can edit anything you can see on screen. Except for the Paste, Group, and Lock commands and those that change the stacking order, most commands work in the multilayer mode. The Paste command does, however, enable you to place objects copied or cut from other layers into the active layer.

MacDraw II displays color and supports color printing, but it comes with only black-and-white patterns. Creating color patterns using MacDraw's eight basic colors takes some work. If, like me, you were scrapping with the kid next to you when your elementary school teacher explained how to mix colors, it can take a few hours to create all the colors that come in a big box of crayons. In addition, color patterns attach to particular documents, so you'll have to store patterns that you want to reuse in Stationery. The only problem with MacDraw II is that it has a limited number of tools and special-effects functions. For example, the program lacks a parallel-line tool, a starburst tool, and a diamond tool. Although you can create a diamond by rotating a square, that's more work than simply drawing a diamond with a tool. Also, you cannot create fountains or shadows in graphic images, nor can you fill text with a pattern or string it along a curved path.

If you need those sorts of effects, you need another package—but then you'll lose out on MacDraw II's wonderful ease of use. For the general user, MacDraw II is the best graphics program to date. Even architects, graphic artists, and other graphics professionals will find it a good choice for many jobs. It doesn't have everything, but it does a lot with what it has.—*Lawrence Stevens*

See *Where to Buy* for contact information.

AppleCD SC

CD ROM drive. **Pros:** Easy to install and use. **Cons:** Expensive; no external audio play button; no SCSI cables provided. **Company:** Apple Computer. **List price:** \$1199. **Requires:** 1MB; SCSI cables; SCSI terminator.



It's a disk drive. It's a stereo component. No, it's both—it's the AppleCD SC. The AppleCD SC compact disk read-only memory (CD ROM) drive marks Apple's first step into the world of optical memory. Like all such drives, the AppleCD SC uses lasers to read information from prerecorded, unerasable disks that look exactly like audio compact disks (CDs). The only difference between the two types of disks is that CD ROM disks can contain applications, graphics, animation, and sound (both computer-generated and digital audio), whereas an audio CD holds only digital audio sound.

Get Ready for Optical

The AppleCD SC is as easy to install as any SCSI hard drive, but you'll need to buy SCSI cables and a terminator. You must also add an INIT to the System so that it recognizes the disks and drive (Apple provides an Installer script to do this). If you want to play audio CDs on the AppleCD SC, you must use Font/DA Mover to install a DA called CD Remote.

Before inserting a CD ROM disk or CD in the AppleCD SC, you must put the disk into a plastic case that acts as a protective cartridge. One case comes with the drive, but you may want to buy more if you plan to swap disks often.



Apple Computer's CD ROM drive

To insert the disk, just pop the case into the slot in the front of the drive. The CD ROM disk then appears on the desktop as a special CD ROM icon. To eject a disk, you either drag its icon to the trash, or choose Eject from the Finder menu (I couldn't find a keyboard command to eject it, though).

A CD ROM acts just like a write-protected floppy and performs in about the same way. You open applications on the CD ROM by double-clicking on them. (Of course you must save the newly created files to a floppy or a hard disk.) You can also copy applications or files by dragging them to a regular drive. Like CD ROM drives in general, the AppleCD SC is slow—especially when it has to search around blocks on the disk to find the information you want. For example, the performance lag is very noticeable when you use the Find File DA to search the CD ROM.

Music to Your Ears

Because the AppleCD SC uses basically the same internal components as audio CD players, you can actually listen to CDs with the drive. You can plug headsets into a minijack located on the front panel of the drive; the same minijack lets you attach a set of battery-powered speakers to the AppleCD SC. Or you can attach the drive to a stereo system via two standard RCA jacks in the back of the drive. Doing this, however, requires either a long SCSI cable or a pair of very long RCA cables because AppleCD SC audio CD functions are completely controlled by Apple's CD Remote DA. There is no external play button on the drive; the Mac must be on for you to play a CD. Apple has wisely put a volume knob on the drive's front panel.

An inserted CD does not appear on the desktop like a CD ROM. Instead, tracks

(continues)

CLARIS

FileMaker II Database Manager

Objective:

Provide individuals and workgroups with powerful, easy-to-use data management, graphically-enhanced for professional-quality reports and forms.

Significant Achievements:

Best-selling database manager for the Macintosh.
1987 MacUser Editors Choice Award.
1987 and 1988 MacWorld World Class Awards.
1988 MacGuide Golden Gavel Award.

Capabilities:

Calculate, sort and print numbers-heavy forms like invoices, purchase orders and expense reports. Produce text-heavy output like lists, mailing labels and form letters. Automate repetitive tasks to a single keystroke. Modify, add, delete at anytime.

Index every entry automatically. Perform lightning-fast searches. View and edit multiple records on-screen. Import and export information and graphics from other Claris programs.

Share FileMaker files with others on your network. No dedicated hardware or complicated setup needed.

Arrange text, logos, drawings, pictures and numbers anywhere on a page, to create reports and forms.

Additional Strengths:

Comes with ready-to-run templates: *Proposal *Sales report/invoice/statement *Purchase order *Expense report *Fixed assets *Mailing list manager, with labels and Rolodex® cards *Membership lists *Checks with register *Bibliography.

Supported by Claris.

References:

MACWORLD: "FileMaker is the best bet...create slick-looking, graphics-loaded reports and forms."

INFOWORLD: "FileMaker is the No.1 choice for producing reports and working with any database publishing task."

MACUSER: "...enters a whole new arena with features that previously have been the exclusive domain of complex relational databases."

Others available upon request.

FileMaker II displays all the traits you look for in a great manager.

What do you look for in a great manager?

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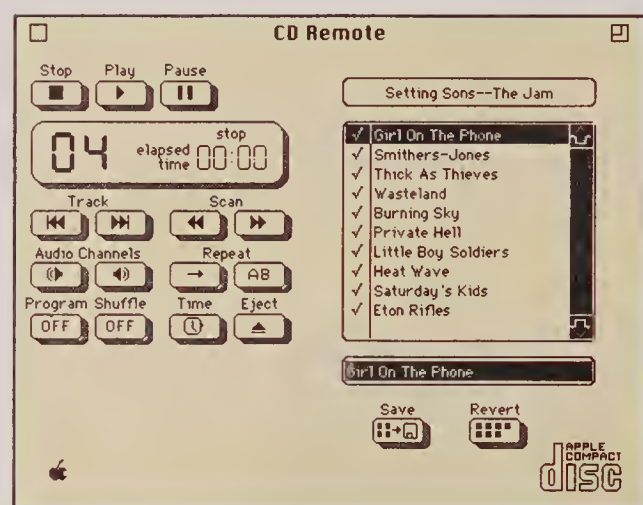
Because FileMaker II® is the one database manager that does everything you really want a database to do.

Perhaps reason enough to convince management the office and Porsche should be yours.

CLARIS

appear in the CD Remote DA. The DA, which is very well designed, includes almost all the functions you'd see on a regular CD player. You can jump from track to track, fast forward or fast reverse through tracks, shuffle tracks, and set beginning and end markers to play specific sections (see "Strike Up the Band").

The AppleCD SC is easy to set up and use, and it seems very reliable. However, it is by no means a replacement for a hard disk, because you can't write information to CD ROM disks. If you need a drive for CD ROM disks, you should definitely consider buying the AppleCD SC. Unfortunately, there's one problem: with the exception of clip art, public domain software, and some vertical applications like medical databases, there just aren't that many CD



Strike Up the Band

When you click on the CD Remote DA's zoom box, you see the expanded remote. You create your own playlist for CDs by selecting tracks and putting them in order. (The screen background has been changed for clarity.)

ROM disks available for the Mac yet. In addition, CD ROM disks can be expensive up front. Current prices for disks range from \$99 for single disks to several thousand dollars for yearly updated subscriptions.

I expect this situation to change next year. CD ROM technology has tremendous potential, especially for distribution of information; it's nice to see Apple taking the lead in this type of advanced storage technology. But until more CD ROM disks are published, \$1199 is a lot of money to spend for an audio CD player that only works when the Mac is on.—Brita Meng

See *Where to Buy* for contact information.

Super 3D 1.0

Three-dimensional drawing program.

Pros: Intuitive interface for a 3-D program; lots of tools and options. **Cons:** Redrawing is slow. **Company:** Silicon Beach Software.

List price: \$295. **Requires:** 512KE; hard disk recommended.



For tasks that involve designing on paper, programs like MacPaint, MacDraw, and SuperPaint (and their advanced CAD cousins) have automated and streamlined drawing. For many design problems, though, there's nothing like building a three-dimensional model to really help visualize the final design. With Super 3D you can create representations of solid objects in a simulated three-dimensional space and get much of the visual, intuitive feel of a model, without sacrificing the speed, simplicity, and flexibility of designing on a computer.

Electronic Clay

Representing three-dimensional space on two-dimensional media is a difficult undertaking. Add the complication of creating three-dimensional shapes with a two-dimensional input device (the mouse), and there's the potential for a really confusing user interface. Super 3D avoids many of those complexities by allowing you to create the outline of a shape using familiar two-dimensional graphic primitives like rectangles, ovals, polygons, lines, and arcs. You can even import a conventional two-dimensional image to use as a template. Once you've created a shape in two dimensions, a variety of tools allow you to rotate, extrude, sweep, and transform the shape into three dimensions. Following an example that Silicon Beach provided, I created a

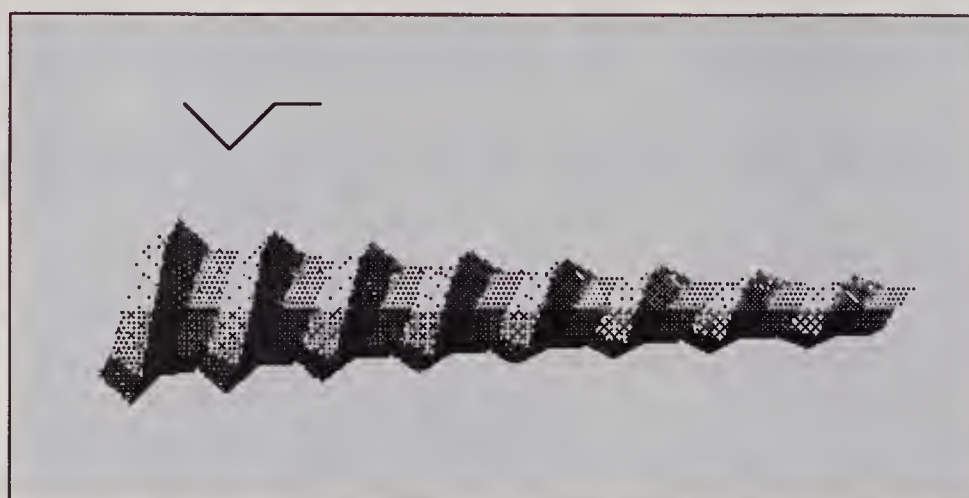
model of a wood screw by making a simple outline of a single thread, then rotating it around the axis of the screw while simultaneously reducing its size and moving it along the desired axis (see "Sweeping Changes") Though the techniques for successfully creating a model weren't immediately obvious to me, reading a few pages of the excellent manual clarified the program's operation.

Super 3D lets you display solid objects (a process called *rendering*) with a variety of options. You can select a gray level for each surface (grays are achieved by dithering black dots and white dots; true grays and colors won't be supported until Silicon Beach releases Super 3D Enhanced, supposedly by the time you read this). You can choose the position and intensity of up to four light sources. Super 3D then automatically creates highlights and shadows, giving your models the appearance of depth and solidity. Super 3D can also display models with computer-like, but much faster, wire-frame rendering.

You view the Super 3D model space through a simulated camera that can be rotated, zoomed, dollied (moved toward or away from a model), and placed at any coordinate in three-dimensional space. You can quickly move the camera to one of several preset views (Front, Back, Top, Bottom, Left, Right, or Home) in case you get lost in your three-dimensional universe. Another viewing option simultaneously displays the front, top, and side views in the same window as your selected view.

Only 11 primitives are available in Super 3D's drawing palette, and they're all two-dimensional. Instead of providing a fixed set of three-dimensional primitives, Super 3D allows you to store shapes in files and import them while you create a model. Once imported, shapes can be modified

(continues)



Sweeping Changes

Using a single Sweep Surfaces command, you can transform a simple 2-D outline of a single thread (top) into the 3-D body of a left-handed wood screw.



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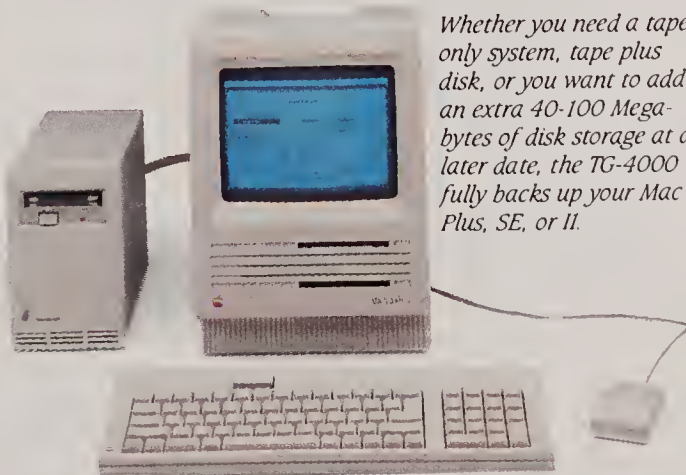
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and manipulated along with the rest of the model. Silicon Beach provides a library of 23 shapes with Super 3D, along with two model alphabets for creating three-dimensional text as part of the model (text created with Super 3D's text tool is for labeling only and doesn't rotate in three-dimensional space with the model).

Super 3D also allows you to construct models from objects. You create and edit such objects in their own separate window, then include them in a model or another object. Unlike shapes, objects retain a separate identity. You can't group objects with shapes and primitives in a model, and if you edit an object all occurrences of that object will reflect the editing changes. Not only does using objects save memory but it also allows you to edit only component pieces, thus speeding up redraw time.

Making It Move

To help you view and display a model, Super 3D can record an animation sequence (a series of frames showing the model in different phases of motion) and play it back as a high-speed movie of the model at work (see "MacMotion"). Super 3D generates simple animations automatically, or you can move a model manually and take frame snapshots where appropriate. In addition, Super 3D can create complex animations by importing a text file that specifies operations to be performed on objects in the model. Generating an animation text file isn't for the faint of heart, but the process is well documented. Ani-

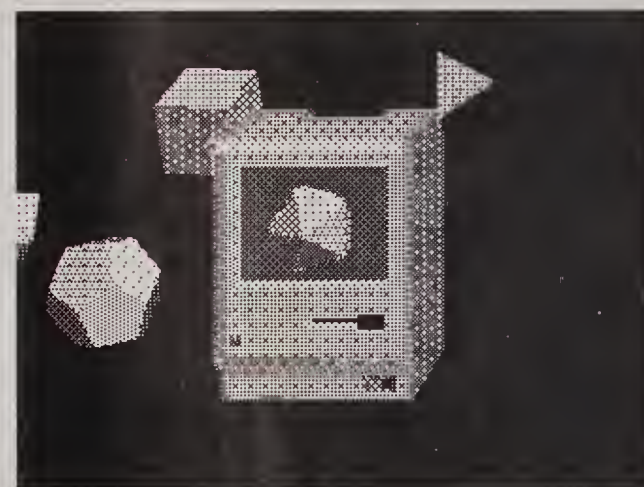
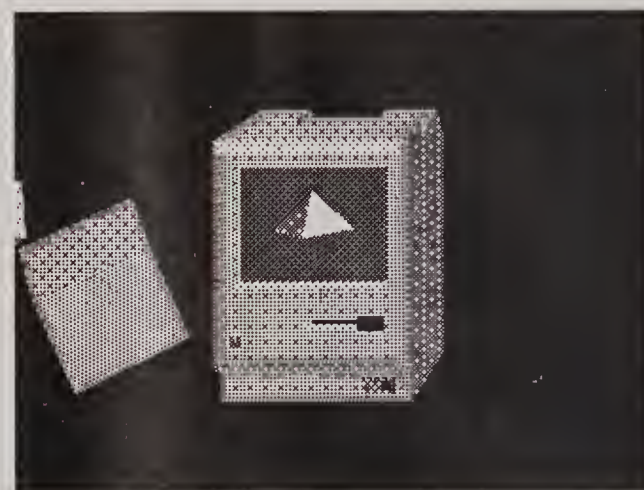
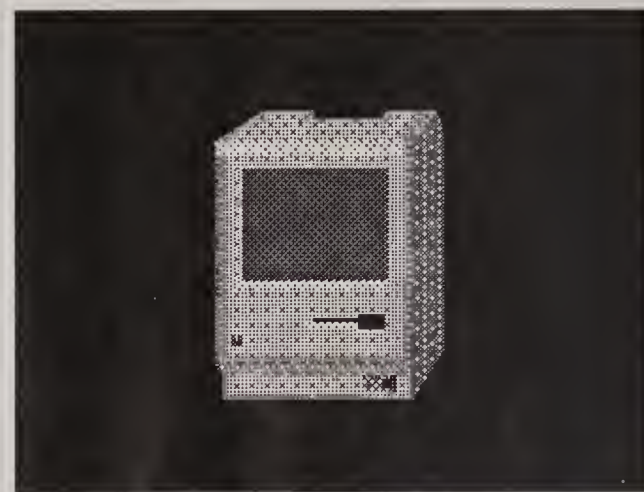
mation text files can be generated manually, with a spreadsheet, or through a programming language (I used HyperTalk). Though animations can take a great deal of machine time to create, and they consume massive amounts of disk space, they are quite impressive.

The set of commands available in Super 3D is rich and extensive. Keyboard shortcuts abound, and the included quick-reference card is a real time-saver. Intelligent use of hierarchical menus and a short-menu mode helps keep the choices from overwhelming the beginner. There are a couple of annoying but otherwise minor quirks in the interface: you can't click on the titles of radio buttons and check boxes (you must hit the button itself), and Super 3D's implementation of pop-up menus doesn't always conform to Apple's user interface guidelines. One feature that's conspicuously missing is a dimensioning/scaling tool; a coordinates window reports dimensions in pixels, but there's no automatic conversion to a real-world scale. These problems are minor, however. In general, the interface is superb.

Slow on the Redraw

Though Silicon Beach is to be commended for ensuring that a product as complex as Super 3D is accessible to users of Macintosh Plus and Macintosh SE computers, performance remains a snake in this three-dimensional Garden of Eden. Redrawing a complex model is painfully slow, and redrawing occurs after almost every drawing or rendering change. The company has gone a long way toward alleviating the problem by allowing a mouse click to interrupt redraws so that another command can be executed immediately, by providing an option that eliminates automatic redrawing, and by allowing you to break down complex models into smaller objects (that redraw more quickly). Still, what would otherwise be an extremely smooth and intuitive interface is often marred by the delay between performing an operation and seeing the results. Running Super 3D on a Mac II helps, though it's remarkable how quickly you can build up to very complex models. Redrawing a single frame of the animation model shown here (see "MacMotion") takes about 6 seconds on a Mac II and about 12 seconds on a Plus.

There's a special thrill to creating realistic, space-filling models directly on a



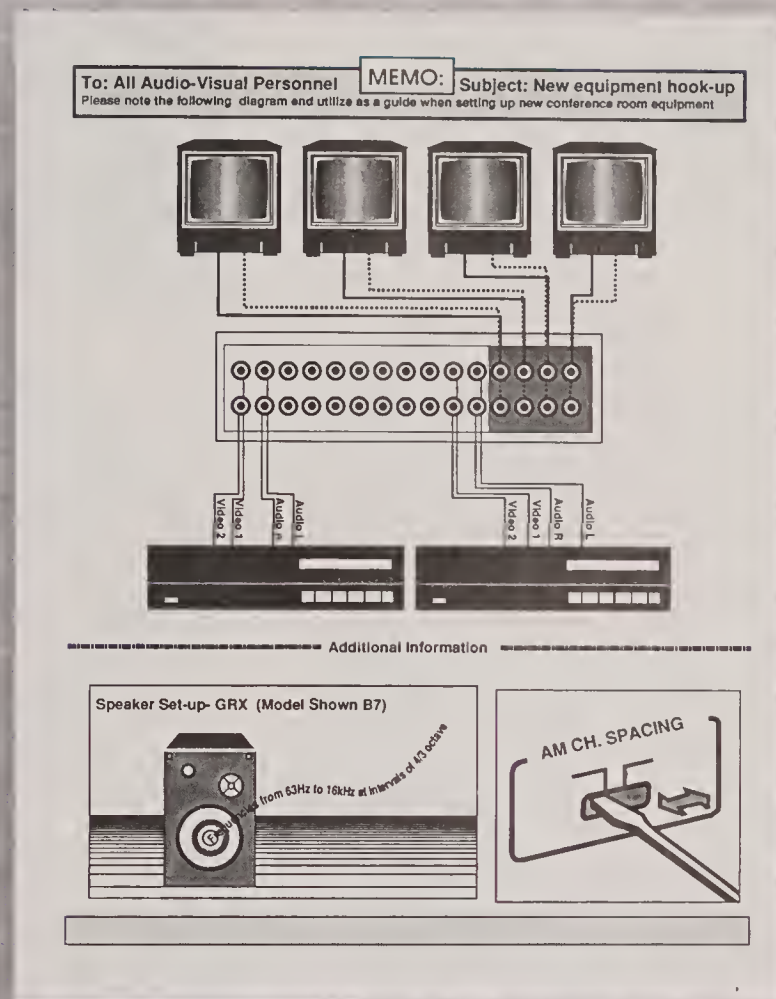
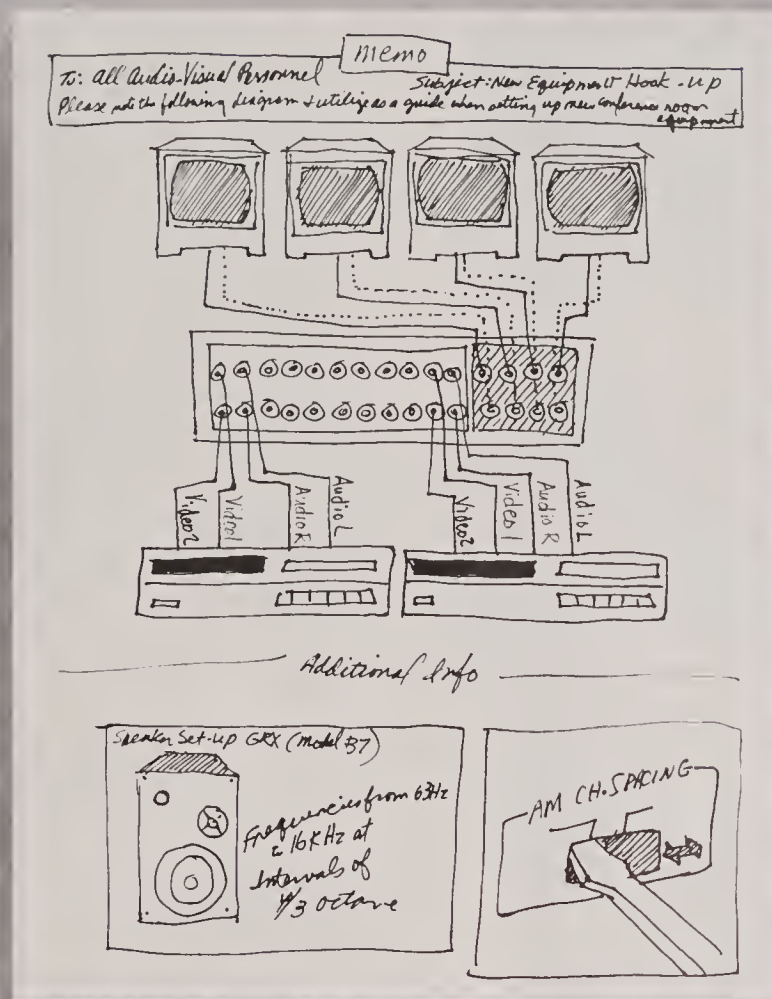
MacMotion

In this sequence of frames from a text animation, three-dimensional objects materialize one after another in the Macintosh, emerge to swirl around the Mac, then disappear back into the screen.

computer. Though modeling in Super 3D demands more patience than drawing with a 2-D graphics program, in many cases the results will easily outweigh the added time and effort. If you've ever felt a desire to reach inside your Mac's screen and play with the objects you've created, Super 3D is for you.—Ron Risley

See *Where to Buy* for contact information.

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PC Viewer Model PCV 6448C+2

LCD projector and interface. **Pros:** Slide shows with special effects can be displayed by remote control without computer; compatible with a variety of computers. **Cons:** Requires fine-tuning and a cool projector for optimal image; shows can't be saved outside projection unit; complete package is expensive. **Company:** In Focus Systems. **List price:** Projection unit \$2795; Mac Plus/SE interface \$119; Mac II interface \$199; carrying case \$69.95. **Requires:** SCSI interface.

Because they're built around liquid crystal display (LCD) plates, the same kind found in laptop computers, panels that display computer screens via overhead transparency projectors are compact, lightweight, and eminently portable. But while a 4-pound flat-panel display might be easy to tote, it's no small load when combined with a 20-pound Macintosh. The latest PC Viewer from In Focus Systems allows you to leave the Mac home but take your presentation with you in the viewer. The PCV 6448C+2 includes a megabyte of CMOS RAM, which can be used to capture screens from a computer and arrange them into shows. With the PC Viewer, you can display presentations automatically or manually, as often as you like.

LCDetails

Optically, the PCV 6448C+2 is identical to the less expensive model 6448AV—that is, it has high contrast and a crisp, clear display (see *Reviews*, August 1988). Both



In Focus Systems' PC Viewer

units are built around a supertwist LCD plate that displays output from a wide variety of computers, including the complete line of Macintoshes as well as IBM PCs and compatibles. The Mac needs a special display adapter to provide a video signal that the PC Viewer can display. Installation of the adapter is simple and straightforward.

The standard 512-by-342-pixel Macintosh screen doesn't fill the whole 640-by-480 LCD display, so In Focus provides a removable frame to mask the extraneous light. The black-on-white Mac screen image is projected as blue on yellow (or yellow on blue); Mac II colors and gray scales can't be displayed. When the controls are adjusted properly and viewing conditions are optimal, the PC Viewer produces a reasonably high-contrast, easy-to-read image. But finding the proper settings requires practice and patience. If the sync control isn't set properly, parts of the image flutter. Contrast often drifts as a projector warms up, making text difficult to read. You can adjust the viewer to correct the drift, but if the projector warms up too much, no amount of adjustment will make the screen readable. Most modern projectors stay cool enough to work with the viewer; older projectors with 300-watt (or higher) bulbs don't.

You Can Take It with You

When not displaying a live copy of a computer screen, the PC Viewer presents a series of menus across the top of its screen for controlling its memory. These work much like Macintosh pop-up menus, ex-

cept that you control them with an 18-button infrared remote device rather than a mouse. It's easy to capture screens, organize them into slide shows, rearrange and edit the shows, and customize the transitions between slides. Menu commands allow you to control the delay and dissolve between slides. It's possible, albeit a little tedious, to create professional-looking shows, complete with random dissolves, window shade effects, and even one-frame-per-second "animation." The PC Viewer's user interface is less intuitive than Mac users might like, but it's fairly straightforward once you play with it for a while.

The PC Viewer can store between 60 and 130 screens in up to ten shows. Currently, however, there's no way to store shows outside of the unit. The addition of a device for off-loading shows would make the 6448C+2 much more practical—especially in situations that require a wide variety of presentations. In the current version, the high-priced PC Viewer is probably worthwhile only for those people who value portability over flexibility.—George Beekman

See *Where to Buy* for contact information.

Extend 1.05

System simulation language and tools.

Pros: Powerful simulation scripting language; primitives that support continuous and discrete event simulations; ability to build libraries of model building blocks; easy-to-use graphics tools. **Cons:** Insufficient manual; lacks primitives for some applications; restrictive graphics style. **Company:** Imagine That. **List price:** \$495. **Requires:** 1MB.

Effective simulation tools are valuable for decision support in complex business, science, and engineering systems. Extend is one of a growing number of programs that enable Macintosh users to construct and run sophisticated simulations that required powerful mainframes just a few years ago. STELLA, for example, offers an array of high-level modeling tools, and Simul (see *Reviews*, *Macworld*, July 1988) provides unique animated simulations for mechanical models. Extend will probably appeal to

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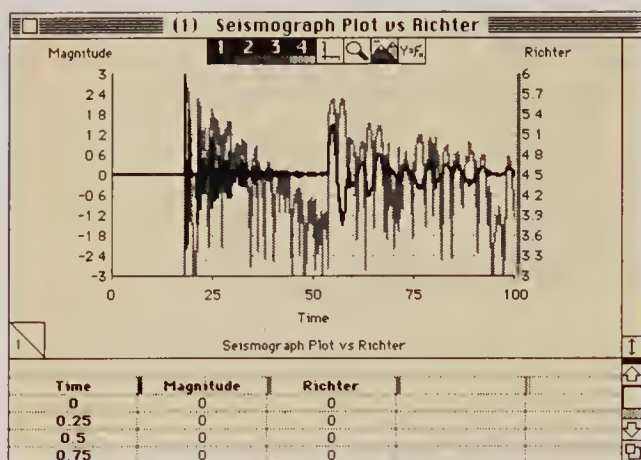
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Plot That Block

The seismograph block displays a plot of the requested output when you run the earthquake simulation. The plot is redrawn each time the simulation is run with different input values.

people who need to construct complex models that require programming flexibility and low-level control over model details.

Building a Simulation

Whether you use Extend to simulate an electronic circuit, stock market performance, or the populations of competing organisms, you construct your simulation model out of a set of connected blocks. Each block is represented by an icon that you can design with Extend's built-in tools or import from a graphics program. The drawing tools are limited but sufficient for most modeling purposes.

Each block icon has connectors through which it can communicate with other blocks in the model. Creation of communication paths between blocks is simple and intuitive. A block may also accept input directly, via its own dialog box. Extend features dialog box construction tools like HyperCard's, which make it easy to customize messages, buttons, and other interface details.

Unfortunately, completing a simulation may not be so easy. Beneath each icon lurks a script that tells the block what to do, using information it receives from other blocks and from user input. It's possible, in principle, to create models without writing scripts, provided you can build the models out of standard blocks included with the program or written by somebody else. But the block libraries that come with the program are limited to just a few examples from each discipline, so most model builders will have to create at least some of their own blocks, including the underlying scripts.

Extend's scripting language, ModL, is similar to C, and C code may often be im-

ported and used in blocks. But even proficient C programmers may have to master some object-oriented programming concepts before writing ModL scripts. While object-oriented programming is not particularly difficult to understand (thousands of novice HyperTalk hackers do it regularly), it sometimes requires conceptual reeducation for traditional C, Pascal, or BASIC programmers. Unfortunately, much of the manual fails to give sufficient information for either beginners or power users. If you're comfortable with C, object-oriented programming, and the principles of system simulation, you *may* find the Extend Manual's 30 pages on ModL adequate. Otherwise, you won't.

Running a Simulation

Running a completed simulation can be entertaining and instructive. Extend includes a plotter block that receives input from other blocks and displays changes in any or all of those values in a line graph (see "Plot That Block"). You can easily change system parameters to see differences in a simulation's outcome and to modify display variables and other graphic output details.

ModL scripts are compiled, so Extend performs most simulations relatively quickly—faster than in Simul's standard interpreted mode but slower than in Simul's Playback option. You can run long, computation-intensive simulations in the background under MultiFinder.

Playing with Blocks

The current version of Extend comes with functions for engineering (Fast Fourier Transform, math, trig, integration), business (present value, future value, interest rate), discrete event simulation (basic queue operations, random, statistical), and plotting. You can incorporate these low-level primitives into an endless variety of high-level simulation tools. Other important mathematical functions have not been included in this release, so users who need functions beyond those found on a good scientific/business calculator should be prepared to create their own custom blocks.

Fortunately, Extend's library facility enables model builders to reuse blocks in other simulations. Imagine That sees the product as continually maturing, and the

developer incorporates new functions and new block libraries at users' request. A planned newsletter will allow Extend users to exchange blocks and scripts in the same way that HyperCard users exchange stacks.

Who Needs Extend?

Extend is not likely to replace Excel as the favored crystal ball in Macintosh business circles, since its interface lacks the familiarity of the classic spreadsheet and calls for more programming ability. But for scientists and engineers who take most of their "what-if" questions to mainframes, Extend provides an attractive desktop alternative. Although competing simulation systems are easier to use in basic situations, Extend's powerful programming language gives it an edge over STELLA for nonstandard models, and Simul can't match Extend's support for discrete event simulations. With a promise of large libraries of building blocks, Extend is particularly attractive to anyone who needs maximum flexibility and who isn't afraid to work for it. —George Beekman and Michael Johnson

See *Where to Buy* for contact information.

MacTell 3.4

Terminal emulator. **Pros:** Unique in Minitel emulation; has a very strong host mode; excellent macro language. **Cons:** Can't take advantage of more than 1MB of RAM; weak manual; requires insertion of master disk once every 35 times the program is launched. **Company:** Baseline. **List price:** \$97. **Requires:** 512K.



MacTell is a telecommunications program with two distinct personalities. It operates well as a standard ASCII terminal program, with most of the features that we've come to take for granted. But MacTell can also operate in a completely different—and unique—mode, turning a Mac into a Minitel videotex terminal.

Minitel is a French videotex service for some 3 million users. Operated by the French phone company, Minitel offers more than 6000 services and online products, ranging from banking services to news, en-

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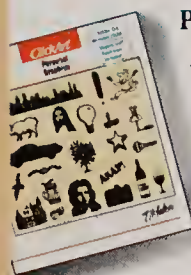


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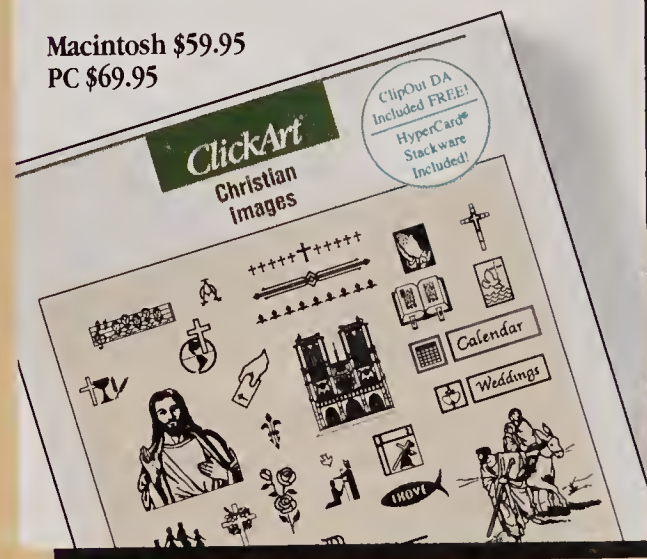
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ertainment, and online erotica. In addition to providing gateways between the United States and France—giving U.S. users access to Minitel's nationwide services in France—some U.S. companies are making their own services available in Minitel format. The largest of these firms, Baseline, is a database service for the film and television industries. It should come as no surprise that Baseline also publishes MacTell.

Videotex's ability to couple pictures with an online database's text can be extremely useful; the pictures, while low-resolution by Macintosh standards, still add an extra dimension to dry text (see "Pictures Online").

Online the French Way

With its unique keys, such as Index, Guide, and Send, Minitel mode gives you an on-screen representation of a Minitel terminal. You can assign all of the screen's Minitel keys to keys on the Mac keyboard, or you can use the mouse to click on the screen keys. Minitel operation is inherently somewhat slow. It connects to Baseline at 1200 and 2400 baud, but the faster speed makes little difference in drawing the screen. Another drawback to the Minitel system is its reliance on pages; you must view each page as a whole, and you cannot scroll backward to see what's gone before. MacTell will save a session in memory and play it back using the Display Pages function after you've disconnected. You can also print sessions, or save them to disk. While you're online, MacTell stores the session in a RAM buffer; unfortunately, MacTell

seems unable to recognize when you have more than 1MB of RAM. On my 4MB machine, the program reported only 198K of buffer space free when running under MultiFinder with no other programs loaded. With MultiFinder switched off, the program allocated 398K to the buffer.

MacTell's ASCII terminal mode provides the familiar large terminal window and supports the expected features of most terminal programs. Included are Xmodem transfers (including 1K blocks and MacBinary), Kermit protocol file transfers, text capture and printing, and ten programmable function keys. MacTell handles communication speeds from 300 to 57,600 baud, and can emulate VT52, IBM 3101, and Tele-video terminals, among others. An on-screen clock shows the current time, and switches to display the elapsed time online. Although MacTell has an automatic dialing feature, I was unable to make it work with my Prometheus Promodem 2400. This only occurs with the old version (1.0) ROM—current models of the modem have no problems autodialing with MacTell.

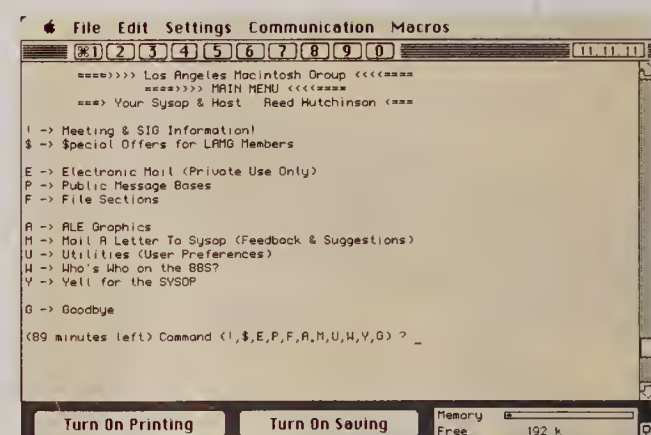
MacTell has a robust macro facility. You save macros as files; you can configure them to run automatically when you start MacTell, or you can double-click them from the Finder. Creating macros is easy and involves little typing. You build macros by choosing commands from menus; if a command requires information (such as a text string you want the program to send), MacTell presents a dialog box that you fill in. Virtually all of MacTell's commands and functions are available to the macro creator, and more than one macro can be chained to perform complex automated sequences. There is also a Learn mode that watches a session and creates a macro on the fly. Although MacTell's macro functions resemble the Autopilots in Smartcom II, MacTell adds the ability to use subroutines in macros, gives you control over speed and communications settings, and has several other features that make its macros more complete than Smartcom II's.

The slim MacTell manual lacks an index and never explains what Minitel is. Considering that most Americans are not familiar with the Minitel system, this is an unfortunate oversight.

An Almost Perfect Host

Another MacTell feature shared by only a few other programs is an outstanding host mode, which turns MacTell into a

mini-BBS. After activating this File Server feature (a somewhat misleading name for the host mode, as the term *file server* is generally used in the context of a local area network), MacTell sets up your modem to receive a call. Callers make menu choices to upload and download files to and from your computer, get a listing of available files, leave messages for you, or read text



Text Only, Please

MacTell's ASCII mode displays the familiar terminal window common to most telecommunications programs. The onscreen clock and graph of available buffer memory are convenient touches.

files while connected. There's even a command that sends a caller's message to your printer. You choose which folders on your hard disk are accessible, and you can lock out unwanted callers with a password. The File Server mode alone is worth the program's price if you want to provide a simple mini-BBS to selected callers without the hassle of setting up a large system like Red Ryder Host. Although MacTell is clearly not as powerful as these other programs, it would suffice for many users.

MacTell is a very good value if you need to provide a low-cost file-transfer facility, and it's the only game in town for connecting to a Minitel service. The program's excellent macro language and host mode rank it with such fine programs as Smartcom II, MicroPhone, and Red Ryder. MacTell's low cost and wide range of functions make it well worth considering if you're shopping for a telecommunications program. —Tom Negrino

See *Where to Buy* for contact information.



Pictures Online

MacTell's Minitel mode shows off the program's ability to receive graphics. The screen mimics an actual Minitel terminal; you operate the on-screen keys with either the keyboard or the mouse.

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CODE 301



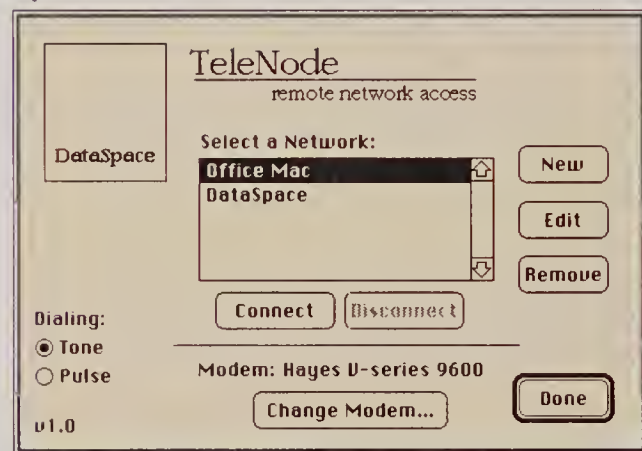
TeleNode 1.0

Network communications hardware and software. **Pros:** No programming for supported modems; compatible with several network applications including AppleShare, Microsoft Mail, Timbuktu, TOPS, and InBox; provides necessary nonstandard cables; password protection for local network. **Cons:** Programming required for nonsupported modems; difficult to cancel connect/disconnect procedure; awkward disconnect procedure. **Company:** DataSpace Corporation. **List price:** \$695. **Requires:** 1MB; LocalTalk network, two modems, one Mac-to-modem cable.



DataSpace's TeleNode enables dial-in (remote) access to a LocalTalk network. With it, a standalone Mac and modem can use E-mail and file servers running on a local office network from the comforts of home, a field office, or even a hotel room.

Like other remote-access products (Shiva's NetSerial and Solana's R-Server, for example), TeleNode has two parts. The first, a hardware device, connects a modem to the LocalTalk network. The second is an asynchronous AppleTalk driver, called RemoteTalk, that replaces the built-in AppleTalk driver in the remote Mac. The remote Mac must use System 3.2 and Finder 5.3 or later.



Who's Calling Whom?

This dialog box appears when you click on the RemoteTalk icon. You can set up RemoteTalk to remember the phone numbers of several dial-in networks. Just highlight the one you want and click Connect.



Network Attachments

DataSpace includes special Mac-to-TeleNode and modem-to-TeleNode cables to configure the hardware, which makes setting up the TeleNode on a network relatively straightforward.

The TeleNode needs a .dmd (DataSpace modem description) file to establish modem connections. But because various modems do things differently (especially control protocols), each type of modem needs a .dmd file for Hayes SmartModem 1200 and 2400 (and true Hayes compatibles), Hayes V-Series 2400 and 9600, Tebit's Trailblazer, and US Robotics' 2400 modems. If you plan to use one of these modems, you're home free. Just select the file you need.

On the other hand, if you're not using one of these modems, you've got some work ahead of you. Namely, you may be stuck creating your own .dmd file with DataSpace's .dmd Compiler.

Writing a .dmd file is not something I'd recommend doing unless you're comfortable with programming and very familiar with modems. DataSpace does say that it's creating more .dmd files; be sure to call the company and see if it has written one for your modem before diving into the compiler.

After you've selected a .dmd file, disconnect the TeleNode from your Mac and connect it to your LocalTalk network and modem; DataSpace provides the modem-to-TeleNode cable. If you don't turn the TeleNode on before the modem, the modem won't get programmed correctly and the network connection won't work.

Remote Connections

You install the RemoteTalk AppleTalk driver on your Mac with Apple's Installer. You also must select a .dmd file for Re-

moteTalk to use; the .dmd file RemoteTalk uses is the same one needed to set up the TeleNode. Again, if DataSpace doesn't have a .dmd file for your modem—or if you haven't already written one for the same type of modem—you'll have to write one. To dial the network, open the Control Panel, select the Network option, and click on RemoteTalk.

I did have some problems with RemoteTalk. I was unable to disconnect by just clicking on the AppleTalk Built-in icon. This seemed slightly awkward to me. In addition, clicking on the Built-in icon brings up an "Are you sure you want to change the AppleTalk connection?" dialog box, even though TeleNode has no intention of disconnecting. To disconnect, you must click on the RemoteTalk icon again and select Disconnect from the RemoteTalk dialog box.

Other problems are more significant. First, you don't have much of an opportunity to cancel the dial-in or disconnect procedure. A "Type ⌘- to cancel" message appears for a split second during the sequence, after which it disappears. When I did try to cancel the dialing, either RemoteTalk kept on dialing, or my Mac crashed and froze.

Second, should your Mac crash while you're connected, RemoteTalk won't automatically try to redial to the network when you restart. In fact, the dialog box still thinks you're connected. To manually redial, you have to disconnect first. Oddly enough, if you choose Restart or Shut Down from the Finder or MultiFinder without disconnecting, RemoteTalk maintains the connection.

While I'd like to see DataSpace clear up some of these RemoteTalk inconsistencies, the TeleNode did work like a champion once I was connected. It's very stable. I tested the TeleNode with AppleShare, Microsoft Mail, and Farallon's Timbuktu, and had no problems with any of them using various Hayes modems. DataSpace's documentation is well organized, and the company does offer excellent toll-free phone support. At \$695, the TeleNode offers a pretty good deal for your money. I'd just advise that you check on the availability of .dmd files for your modems before you buy.—Brita Meng

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Circle 185 on reader service card

SupraModem 2400

2400-baud modem. **Pros:** Small; cheap; Hayes-compatible; faster than 1200-baud modems. **Cons:** Tinny speaker. **Company:** Supra Corporation. **List price:** \$179.95; \$239.95 with Mac-compatible cable and software (SupraModem 2400MC).



The SupraModem 2400 is a 2400-baud, Hayes-compatible external modem that hooks up to your Macintosh (or any other computer) via a serial cable. It connects with systems running at 300, 600, 1200, or 2400 baud. It works just fine. The End.

Uh, wait a second, Bruce. I asked for a 900-word review. You still owe me about 830. What gives?

Well, I'm not sure what more you can say about a modem. It's probably one of the most undemanding, uncomplicated, and unexciting computer appliances around—provided it is "Hayes-compatible" and actually works. You just plug it in—to a power outlet, to a phone line, and to a computer—and run whatever communications software you have. I've used the SupraModem 2400 with six different telecom programs on two different computers (a Mac II and a Compaq 286). It works just fine. The End.

But how does it compare to other modems? What makes it different, unique even?

That's just the point: modems don't want to be unique. A modem that is not completely compatible with the Hayes Smartmodem series is just asking for trouble. There may be some way in which the

SupraModem 2400 isn't Hayes-compatible, but I sure haven't been able to find it. In fact, with one software package, it worked better than my old trusty Hayes Smartmodem 1200.

As for how it compares to other modems out there... well, send me some, and I'll let you know. All I know is that it works just fine. The End.

But what about the 2400-baud stuff? What difference does that make?

Well, without getting too technical, the baud rate of a modem is the maximum speed at which it can send and receive information. Divide the baud rate by 10, and you get a rough estimate of how many characters can be sent each second. The actual speed of transmission depends on the maximum baud rate of the modems at each end of the phone line.



The SupraModem 2400 external modem.

All this makes the SupraModem 2400 roughly twice as fast as a 1200-baud modem—provided the system on the other end also supports 2400 baud. Unfortunately, not all bulletin boards and conferencing systems support 2400 baud, and the commercial ones that do usually charge more for calling in at 2400 baud. On top of that, there are fewer 2400-baud access numbers for services such as Tymnet and TeleNet, which means that you may have a toll phone call on top of higher conferencing rates. Remind me to send you an expense report.

Of course, a higher baud rate may not really save that much time or money. When I call into BIX or CompuServe, I spend most of my time reading and composing messages while charges pile up. On the other hand, the SupraModem lets me download (or upload) files nearly twice as fast—unless, of course, the conferencing system is bogged down, in which case I'm probably better off calling at 1200 baud.

But you can't blame a modem for a bogged-down conferencing line. The Su-

praModem just does what it's asked to do. And it does it well. The End.

But is there any reason why someone might buy this over, say, a Hayes Smartmodem 2400?

Yeah: price. I don't know what the current list is for a Hayes Smartmodem 2400, but I suspect it's probably about double that of the SupraModem 2400. (It's \$599. —Ed.) There are other inexpensive 2400-baud modems out there, but I haven't used them. I've used this one.

Supra will probably want to sell you the SupraModem 2400MC, which comes with the necessary Mac-to-modem cable and some kind of communications software, and costs \$60 more. My advice is to get the regular SupraModem 2400, buy a cable from a dealer, and order the telecom package of your choice by mail: MicroPhone, Red Ryder, or whatever. There are even some good public domain and shareware packages out there; check around.

What does the modem look like?

Sort of like a shrunken, slightly mutated Hayes Smartmodem. The power switch is in the front (another advantage over the Hayes), the indicator lights are in the same order as on the Hayes but are just letters that light up, and the speaker sounds cheap—but what do you expect?

The innards are pretty nice, though. It's got nonvolatile RAM to store your configuration, even when the power's off. It can even store a phone number, which it can dial with a single command. Of course, it supports all the Hayes commands and registers. And it has some built-in diagnostic tests, to boot.

Is there any technical info that readers might want?

Yeah. It'll work with the following asynchronous modem types:

CCITT V.21 at 300 bps (bits per second)

CCITT V.22 at 600 and 1200 bps

CCITT V.22 bis at 1200 and 2400 bps

Bell 103 at 300 bps

Bell 212A at 1200 bps

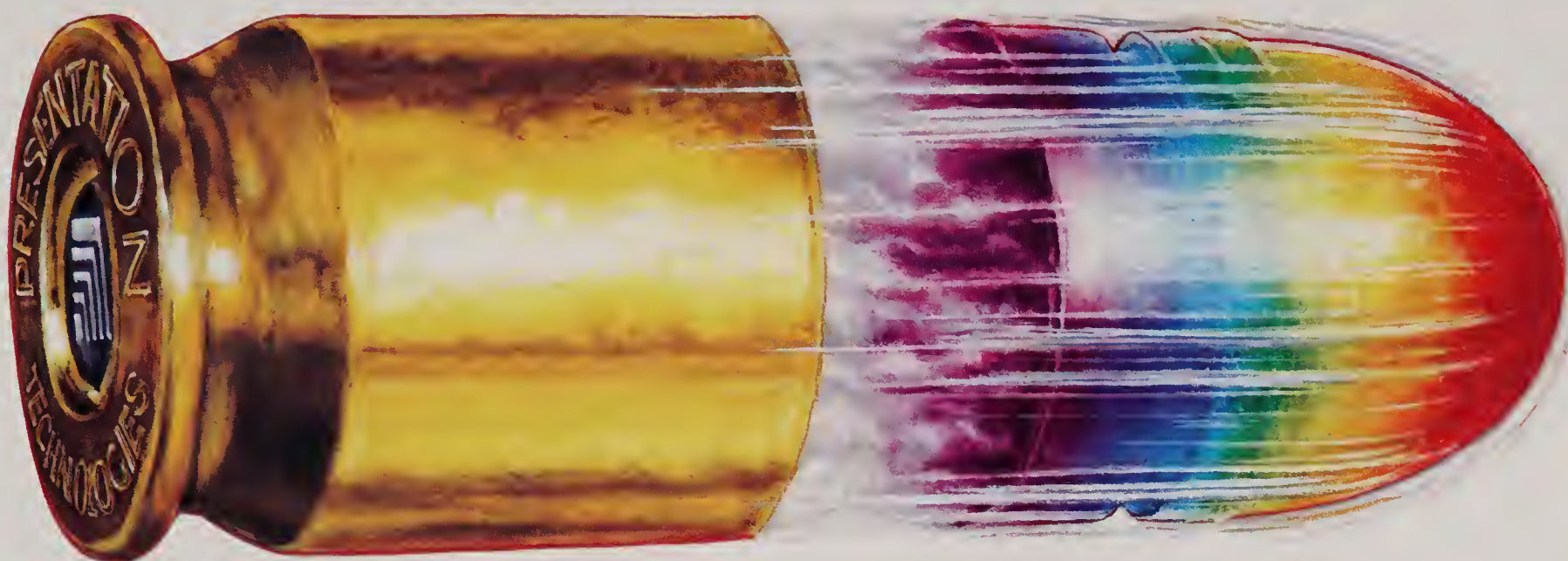
Also, it has a 40-character command buffer, and volatile as well as nonvolatile RAM for the user configuration.

So, your bottom-line assessment is...?

It's inexpensive, Hayes-compatible, and works fine. Just like I said. —Bruce Webster

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Kurta IS/ADB, Penworks 1.0

Tablet input system for use with Apple Desktop Bus (ADB). **Pros:** Connects to ADB, doesn't tie up serial port; well constructed; lifetime electronics warranty. **Cons:** Penworks software has bugs and needs improvement; poor documentation. **Company:** Kurta Corporation. **List price:** Kurta IS/ADB with Penworks, corded single-switch pen and cables \$395; corded four-button cursor \$100; corded dual-action pen \$150; cordless three-switch pen \$150; cordless four-button pen \$150. **Requires:** Mac with ADB (SE or Mac II).



Although Mac users tend to rely heavily on the mouse, there are times when a different kind of input device may offer certain advantages. For instance, while tablets and mice can both be used to pull down menus, launch applications, and drag icons, it is far easier to draw freehand or trace with a tablet. And there are things a tablet can do that a mouse can't. Imagine that you're using MacDraw or one of the CAD or Paint programs, and you want to input the outline of a shape into the Mac system. You already have the shape accurately drawn on paper; now you need to input a series of points found on the shape's outline as a series of dots or locations on the Mac screen and then join them with lines, arcs, and so forth. This process, called *digitizing*, just can't be done with a mouse.

A mouse works in a relative fashion, while tablets are generally absolute de-

vices. When you lift a mouse to move it to a new spot, the screen cursor stays still. The cursor moves relative to mouse motion on a surface. A tablet, however, usually represents the Mac's screen in miniature—for example, the upper-left corner of the tablet correlates to the upper-left corner of the screen. Lift the stylus and move it to the upper-left corner of the tablet and the cursor jumps to the top-left corner of the screen. Drag the tablet's stylus to the right and the cursor travels to the right.

The Kurta IS/ADB Alternative

The Kurta IS/ADB box consists of a tablet, a "pen" (stylus), a disk with Penworks software, an ADB cable, a brief 14 pages of inadequate documentation, plus a separate sheet describing the Penworks driver installation.

The tablet itself blends in very well with the Mac from an appearance standpoint and has a ribbed design similar to that found on standard Mac cases. The box slopes at a comfortable angle of approximately 9 degrees and has a working area 8½ inches high and 11 inches wide, with a clear plastic overlay; the tablet measures 13½ by 12 by 2 inches overall.

The pen pointers are lightweight and sturdy. The corded pen is about the same size as a mechanical drafting pencil. The cordless version has a larger diameter (about ⅝ inch) because it must accommodate three batteries.

The four-button cursor has a clear plastic target with built-in cross hairs and is especially useful in accurately locating points on items to be digitized.

Hardware installation is as simple as connecting a keyboard to the Mac's ADB. The back of the tablet has three connectors, one for the stylus cable, the other two

for daisy-chaining to the ADB. Kurta warns that because of ADB power supply limitations, the tablet should be the only device besides a keyboard on the ADB, a warning that I found to be almost correct. If you insert the Kurta tablet between the Mac and other ADB devices such as the keyboard, it can cause problems other than excessive power drain. For example, my Mac II power-on switch (located on the keyboard) wouldn't operate in this configuration, nor would an ADB software protection module used by one European CAD developer. (In Europe, copy protection is commonly accomplished by requiring the use of a piece of proprietary hardware. Without this "magic box," you can't run the software.)

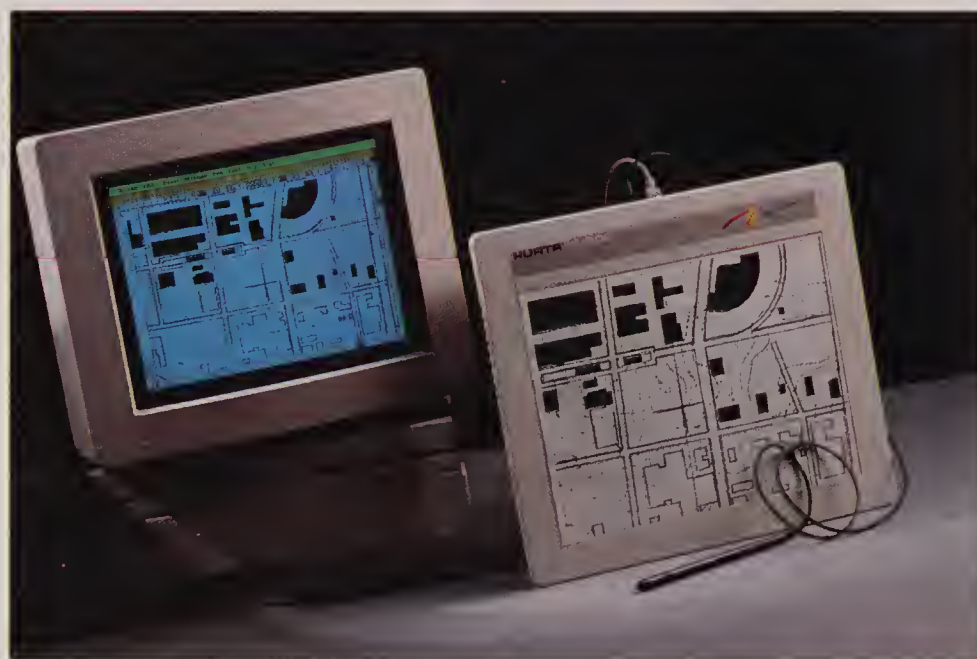
When I juggled the cable connections around and made the tablet the last device in the ADB daisy chain, all the problems disappeared. The Apple mouse worked just fine when connected on either side of the tablet.

Installing the Penworks software is painless, requiring only the running of a script under the usual Apple Install application. This places the driver in the System Folder. Then you restart the Mac and go on your merry way. After you reboot the Mac, the mouse still works in the usual way and you can still adjust it from the Control Panel. The tablet is ready to go and requires no Control Panel settings.

Problems

Some problems surfaced, however. My Mac II has multiple monitors. I quickly discovered that the tablet only works on the start-up screen; I couldn't move the cursor to another screen. Kurta is already aware of this, and the documentation instructs you

(continues)



Tablet Input System
The Kurta tablet is ideal for drawing irregular lines and arcs. Here a paper drawing has been placed on the tablet to be traced and transmitted to the Macintosh screen.

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to call Kurta under these circumstances. In my case, the company responded by mailing me a new disk containing a "fix," which supposedly handles multiple screens. According to one of its programmers, Kurta is still enhancing the Penworks software.

The new disk enabled me to use multiple screens on my Mac II, but with severe limitations when using the setup facilities in the Monitors portion of the Apple Control Panel. If the start-up screen (the one with the menu bar) is the rightmost or lowest screen on the Control Panel diagram, the program assigns the full tablet area to just that one screen. If the start-up screen is leftmost on the Control Panel, the tablet area gets subdivided so that one portion is dedicated to the left screen and another portion is dedicated to the right screen. How much of the tablet gets dedicated to any screen is a function of the screen's resolution—the more pixels, the more of the tablet devoted to it—and the total number of screens on the Mac II. While it's good to be able to use the tablet with multiple screens, there are also problems, such as being unable to digitize anything that doesn't fit within the area of the tablet now dedicated to a particular screen.

Using alternative pointing devices reveals yet another problem. It is nearly impossible to double-click with the corded stylus. Apparently the software looks for two clicks at exactly the same x-y location; the highly glossy tablet surface makes it nearly impossible to keep the stylus from moving just a hair between clicks. The four-button cursor device fortunately doesn't exhibit this problem.

Do Mice Face Total Extinction?

From a hardware standpoint, the Kurta IS/ADB is excellent. It is well made and its electronic components carry a lifetime warranty. Pointing devices, software, cables, and accessories are warranted for a full year. Connection via the ADB is a big plus. But there is still much room for improvement with the Penworks program. While it didn't corrupt my system files, as the earlier serial port version of Penworks did, there are still some bugs and shortcomings.

Assuming Kurta comes through with the software improvements it's promised, a good hardware product will become even better.—David L. Peltz

See *Where to Buy* for contact information.



Lunar Rescue 1.0

Arcade-style graphics game. **Pros:** *Rescue strategy makes the game more than just a shoot-'em-up.* **Cons:** *Mouse sometimes refuses to drag an icon during cargo loading; game needs more convenient Revert function; key disk required.* **Company:** PCAL. **List price** \$59.95. **Requires:** 512KE.



The premise of Lunar Rescue is that a murderous automated defense network has been installed to protect traffic along canals connecting the Moon's 26 cities. This weaponry and other lunar utilities are serviced by ICE (Independent Computerized Ecosystem), which is in hot water. Its defense network has been sabotaged by antisocial lunatics who have hidden the ICE crystals that control all the cannons, lasers, missiles, and floating mines. This has caused the automatic defense network to go berserk, shooting at everything indiscriminately and threatening to end your career as a free-trading lunar pilot.

"Action Displays" shows the view screen and below it (center) the radar screen and icons representing fuel, weapons, and other information. Guided missiles, lasers, and floating mines are shown attacking as the craft's space cannon destroys a gun turret. The bottom portion shows four open cargo pods with icons in two of them representing oil, robots, animal protein, and other items, plus the craft's empty dump chamber and the contents of a nearby wreck. You can open cargo pods only on the lunar surface, not during flight or combat. You use trading profits to buy weapons, fuel, cloaking devices, and shields for your spacecraft, and you receive

additional credits for each cannon, laser, or missile turret you destroy. But there is also a strategic element that creates maddening demands on the player and transcends the tricky task of piloting a lunar cargo vehicle through jagged, unpredictable canyons and volleys of projectiles.

Rescue Strategies

In Lunar Rescue, combat is secondary to the greater task. Cut off from each other, the Moon's 26 cities will perish if you don't move essential goods from city to city. As you supply one city, you learn that two other cities are dying. Success in Lunar Rescue requires that you make sharp trading decisions based on developing commodities needs, weigh the challenges involved in traveling to one destination versus another, and become skillful enough as a pilot to fly an overloaded cargo craft through combat situations and still search out the missing ICE crystals. When you have restored five of the seven missing crystals, the ICE network will be back in business and you can retire from cargo piloting as a hero.

You start a game of Lunar Rescue at Data Central, the point of arrival at any new city. The main feature of Data Central is a map of the lunar colonies and interconnecting canals. You can get information about any city by clicking on the appropriate map button. Information about the needs of the different cities often determines your next destination.

(continues)



Action Displays

Heat-seeking missiles respond to the spacecraft's thrusters and weapons. One ICE crystal has been recovered. The radar screen gives a wider view. Open cargo pods and lunar wreck contents, not actually visible during flight or combat, are shown here for demonstration.

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Trading Strategies

When you select Trade from the Data Central menu in any city, you arrive at Trade Central. The number of credits you have is prominently displayed. Symbols represent different commodities and items. When you click on a commodity, the program displays the amount available plus its sale and purchase prices. However, you need to retain enough credits to purchase a whole new vessel, as well as fuel, weaponry, and cargo, in the likely event of losing the vessel you have. In addition to assuring yourself of enough profit for survival, you must also plan your cargo carefully, carrying only what is essential while leaving pod space for valuable items you salvage from wrecks along the way, and for the missing ICE crystals you hope to find.

Craft Control

Moon-hopping in Lunar Rescue has purposely been kept appropriately simple (other orbital flight simulators are more realistic). The mouse controls the orientation of the spacecraft and fires propulsion rockets, while keyboard commands fire weapons. To shoot, you stop firing the propulsion rocket, take aim by rotating the spacecraft, fire weapons by keyboard command, then rotate the craft to its original orientation for more propulsion. The techniques become instinctive after two or three hours of play.

Flight controls show distances, amount of fuel and munitions remaining, the condition of shields, and a lunar clock ticking off precious hours. The radar screen gives you a wider view of the landscape, so you can anticipate hazards (like sheer cliffs you might run into, or floating space mines drifting into your path) before you see them in the main view window. You may land anywhere you think you can safely.

The spacecraft's flight characteristics differ according to cargo load. Its responsiveness is well programmed, ranging progressively from the dangerous skittishness of a powerful sports car, when cargo pods are empty, to the sloppy sluggishness of an overloaded station wagon when the cargo pods are full and/or rocket engines have been lost. A keyboard command toggles the cargo doors when the craft is on the lunar surface, as shown in the bottom portion of "Action Displays," and you can either load salvaged items or drag icons representing such necessities as fuel, weapons, or spare engines from storage to

immediate use. In this way, you can make repairs and refuel during long, hard-fought journeys.

Crash Course

Lunar Rescue has a practice mode for perfecting crash-proof flight and combat. Even after practice runs, most players will suffer numerous crashes; the game would benefit from a Revert procedure to prevent this needless hassle. As it now stands, you must exit the game in which you crashed, open the backup game you have presumably stored, and, for prudence, store another backup game before resuming. Another annoyance is the occasional tendency of the mouse to refuse to move an icon when you are loading cargo, but this glitch is not so bothersome.

Lunar Rescue is commendable as a game with humanitarian goals, its killing being limited to machines. The manual is concise and adequate. Although little is ground-breaking in the game or in its technology-runs-amok theme, Lunar Rescue creates challenges on more than one level and may become addictive for those who crave long-haul, arcade-style action.

—Keith McCandless

See *Where to Buy* for contact information.

Retriever 1.0

Desk accessory database. **Pros:** Fast; convenient; easy import/export for mail merge; special HyperCard access. **Cons:** No calculated fields. **Company:** Exodus Software. **List price:** \$89.95. **Requires:** 512K.



In principle, MultiFinder has made desk accessories almost unnecessary; with 6 megabytes of RAM, you can just load FileMaker or Reflex Plus and always have a database just a few clicks away as you work in other applications. However, since multimegabyte machines are still a minority, a well-designed and compact DA for file handling could be a considerable convenience for people who work mostly with word processors or page-layout programs. Retriever does a great job of providing this



convenience, within its not-particularly-restrictive limits. If you need occasional fast access to a variety of simple (nonrelational) files, Retriever could easily become one of your favorite Mac utilities.

Tabling the Motion

Retriever works with simple table-style files. It imports data from HyperCard stacks and from any text file that has tab or comma delimiters (a standard export mode for most databases and spreadsheets). Once data has been imported into Retriever files, you can call it up with a few clicks, sort it, search it, and cut and paste data selections to other applications. Retriever files also export to HyperCard and to tab- or comma-delimited text. A special section of the manual steps through production of mail merge files for Microsoft Word.

Once you have established data files, using Retriever is extremely easy—compared to fancier file managers—since only the most basic functions are supported. A small icon menu gives you six possible choices: Mark/Unmark, Sort, Find, Copy, Add Record, and Help. Believe it or not, all relevant help information for standard use fits comfortably on a single screen. This includes instructions for hiding and displaying columns, editing, and date/time stamping. The Retriever menu itself is mostly used for rearranging columns and managing import and export.

This simplicity may at first make you think that Retriever doesn't offer much for its price. For example, the spreadsheet

(continues)

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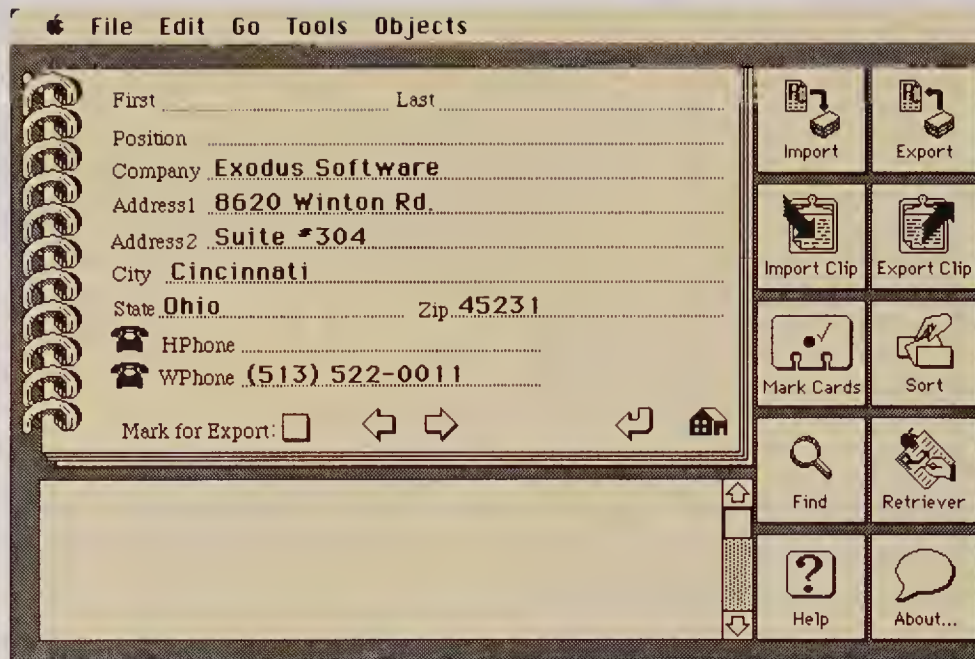


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Getting Hyper

For flashy effects, data from Retriever files can be popped over to HyperCard (note the import/export buttons at upper-right corner of the card), where graphics and calculated fields are possible.



built into SideKick can mimic most Retriever functions and perform calculations as well. Furthermore, the database in Microsoft Works has more features and can be called up as an always-open window. But Retriever has some built-in conveniences that are quite valuable. You can mark records according to a search criterion for printing or export. You can store long (254-character) text fields and edit them in a dialog-box expanded view. You can hide a selected column of fields with a double-click and then print only the visible fields in a table.

Performance on standard file-manager benchmarks is also respectable. Retriever imports records from text files at 10 to 20 records per second, depending on record length. In a 1000-record file (maximum file size is 32K) searches for individual records took a few seconds, and sorts on numeric and text fields ranged from 30 to 50 seconds. Since the typical Retriever file will probably be a few hundred records, most manipulations will take only a few seconds.

Into the Stacks

Retriever lacks two items Mac users have come to expect from databases: graphics fields and calculated fields (fields whose value is computed from data in other numeric fields). To at least partially remedy this shortcoming, Retriever offers an interface to HyperCard.

The essence of the interface scheme is to provide field compatibility between records in Retriever files and cards in HyperCard stacks (see "Getting Hyper"). Exodus provides a utility for installing import and

export buttons on stacks to make the initial images of Retriever files in HyperCard, and Retriever includes three model stacks with matching Retriever files so you can see how it's done. The HyperCard stacks contain examples that show you how to use HyperCard to make bar charts from data in Retriever files, but if you're seriously interested in charting or extensive calculation, Retriever isn't the program for you. There's also the drawback that you can't simply toggle back and forth between HyperCard and Retriever—since Retriever is a DA, HyperCard can be active only when Retriever is closed. For those who have address lists and other important data in stacks, however, Retriever access to this information from other applications will be particularly convenient.

For the Record

Retriever is not quite Microsoft File as a DA, but it's close. With a mere 54K this utility offers 90 percent of the functionality of a standard file manager, lacking only calculated fields. It's simple enough that you can't forget how to use it, even with once-a-week use. And Retriever has been optimized for use with both standard word processors and HyperCard. If you work with lists or tables but don't want to spend much time mastering a new application (training time for Retriever is about ten minutes), take this little program seriously.—Charles Seiter

See *Where to Buy* for contact information.

Where in the World Is Carmen Sandiego? 1.0

Geography/mystery game. **Pros:** Teaches geography, use of reference material, and deductive reasoning in an entertaining manner; appealing sound effects and graphics; comes with copy of World Almanac. **Cons:** Repetitious animation gets tedious; predictable number of steps at each level of play; key-disk copy protection.

Company: Broderbund Software. **List price:** \$39.95. **Requires:** 512K.



Where in the World Is Carmen Sandiego? is one of those rare computer games that are both educational and entertaining. Long available in versions for Apple II, IBM PC, and Commodore computers, the program is a favorite among teachers and, according to them, among students as well. Now at long last the elusive Carmen Sandiego is available for the Macintosh.

Part mystery, part geography lesson, Where in the World requires you, as a detective, to decipher clues that reveal in which of 30 cities a globe-trotting thief is hiding. At the same time you gather clues that will help you identify which of ten master criminals you must arrest. As you solve more cases, you move up in rank and the game becomes more difficult.

The Sounds of Crime

Right from the start, Where in the World grabs your attention with imaginative sounds and graphics. You hear breaking glass, an alarm, and racing footsteps

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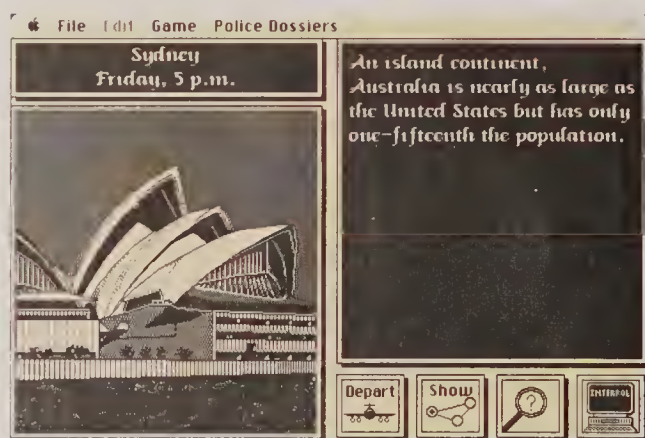
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as a trio of keystone cops chase a trench-coated fugitive across the screen. But apart from the opening and closing animation and an occasional evil henchman, most of the game's graphics consist of static images of famous sights in each city.

You start a session by entering your name via the keyboard, but you actually play the game using only the mouse. For instance, click on the magnifying-glass icon at the bottom of the screen to begin the search for leads (see "Main Screen"). From there you might click on the hotel where a bellboy tells you that the suspect was reading a Malagasy dictionary and that he had a tattoo. Another icon leads to a short list of destinations where the thief could have gone. Using the latest edition of the *World Almanac and Book of Facts* (Pharos Books) that comes with the program, you can figure out that Malagasy is a language spoken in Moroni, the capital of Comoros in the Indian Ocean. Call up a map of the world, click on Moroni, and you're on your way.



Main Screen

The main screen for each city provides an introduction to the locale. To start looking for clues, use the magnifying-glass icon. The Depart icon leads to a world map, and the Show icon lists three or four possible destinations.

Fingering the Suspect

You will want to remember that the suspect has a tattoo. By feeding such clues into the Interpol computer you can narrow the list of suspects until only one remains and you are issued a warrant. If you catch up with the fugitive before you have obtained a warrant, the thief escapes and you lose. This element of the program, which is designed to exercise deductive reasoning skills, often seems a little too simple even for young players. Sometimes, however, the necessary clues are scarce or subtle, adding an element of tension to the game.

As you search for clues or travel to another city, a clock advances, but during the

time you spend looking up information in the almanac, the clock stands still. This is a nice feature that encourages youngsters to use the almanac instead of hopping blindly from city to city. As you move up in rank, you have to travel to more cities before you catch up with the suspect, and the clues get pretty challenging—even for a well-traveled adult. What, for instance, is a *taipan*, and where do you look in the *World Almanac* to find out? Although familiar clues pop up time and again, and the number of cities you must pass through is predictable, each case poses different problems.

Family Fun

Where in the World is not likely to keep an adult game-freak occupied for hours on end the way some kinds of interactive fantasy would. Each round of play is relatively short, and you have ample time to catch the thief. Although you can fly off to parts unknown and temporarily lose the suspect, your route is always fairly straightforward from beginning to end. And the animation that punctuates the game and seems so engaging at first can become tedious.

This is not to say that Where in the World won't entertain, challenge, or even educate adults—especially those who enjoy thumbing through almanacs as a way of quizzing themselves on their knowledge of the world. And some of the cases have a sense of humor that seems directed at a more mature audience. (In Mexico City the thief absconds with the secret remedy for Montezuma's Revenge.) Where in the World also makes fine family entertainment because children of various ages can play it noncompetitively with their parents.

Where in the World Is Carmen Sandiego? is a great alternative to arcade/action games. It not only teaches kids about different countries, it also motivates them to look for the information they need in a reference book and gets them to think deductively.

We've had to wait a long time for Where in the World to appear for the Macintosh. In the meantime, Brøderbund has come out with two Carmen Sandiego sequels on the IBM PC—Where in the USA, and Where in Europe. The company is looking into the possibility of porting these two programs to the Mac.—Gerry Lukos

See *Where to Buy* for contact information.

40MB Tape Backups

Tecmar QT-Mac40 *Pros:* Well-crafted design; relatively quiet; good software; informative status lights. *Cons:* Not enough cables provided; only one SCSI port; no terminator. **Company:** Tecmar. **List price:** \$1395. **Requires:** 1MB; SCSI interface.

Tallgrass TG-4000 *Pros:* Relatively inexpensive; delayed-backup timer; script capabilities; fast retensioning cycle. *Cons:* Bulky; noisy; poor Macintosh interface; poor-quality SCSI ID-number switch; cannot print directory of tape on screen. **Company:** Tallgrass Technology. **List price:** \$1195 (\$2495 for TG-4040, 40MB drive/tape combo). **Requires:** 1MB; SCSI interface.



Don't let the 40 in the term 40-megabyte tape drive fool you. It refers to the approximate storage capacity of one DC-2000 mini tape cartridge for these units (for more information on backup products, see "Why Say No to Backup?" in this issue). The Tecmar formats the cartridge to 38.256MB; the Tallgrass to 42.5MB. If you want to back up more data, the software helps you do it on multiple tapes, thereby giving you essentially unlimited capacity. Conversely, if you are backing up smaller bodies of data, you can perform multiple backups on one tape.

Beauty and the Beast

The moment I sat the two backup units on the desk next to my Mac, I thought of Beauty and the Beast. The Tecmar came well packaged and is a sleek, compact unit

(continues)



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The Tecmar QT-Mac40 and the Tallgrass TG-4000 work well. Although Tecmar's software is more Mac-like, the Tallgrass software has two features that the QT-Mac40 software lacks.



with an array of status lights on the front. Gadget freaks will like it. The Tallgrass—a bulky, homely unit—was actually rattling around in the box when it arrived. It was so poorly packaged I was surprised that it started right up and gave me no mechanical problems during use, an unintentional testimonial to its robustness. What really fixed “The Beast” nickname on the Tallgrass unit for me, however, was the noise—it is the noisiest Mac peripheral I have ever heard.

As I set things up, the comparison became more balanced. One of the sacrifices Tecmar made to get that nice, sleek profile for its unit was to include only one SCSI port on the back. Thus, the cables provided with the unit are adequate only for use

with a single internal hard disk. If you are using an external hard disk or multiple SCSI devices, you need additional cables, including a strange T SCSI adapter cable that costs \$79. In fact, a complete optional cable kit (with the T adapter, terminator, and pin connector) lists for \$149 (ouch).

The machines ran true to their Beauty and Beast nicknames when I tried out the software. The Tecmar's software is very Mac-like, it offers online context-sensitive help, and it has lots of progress indicators for backup and restore. When you open the Tallgrass software, however, the main menu bar, including the Apple menu, disappears. You get only a window with a dialog box. And no desk accessories are available.

But the Tallgrass unit has two software features that the Tecmar sorely lacks—a script-writing facility and a delayed timer for backups. With these features, you can set your backup unit to work after everyone has gone home. Then the noise won't be a problem, nor will the unit interfere with work on your network.

Stopwatches, Reliability, and Such

Both Tallgrass and Tecmar support the industry standard Q100 formatting. Tecmar, however, offers a variation. The Q100 is normally formatted at a 2:1 interleaf; the Tecmar unit can also be formatted at 1:1, giving it a speed advantage, but taking away its compatibility advantage.

In absolute raw read/write speed, the Tecmar unit is about 20 percent faster than the Tallgrass. The Tecmar reads and writes about 2.5MB a minute, ideally filling a 40MB tape in about 16 minutes (it takes a bit longer in practice). The Tallgrass, at 2MB per minute, requires a little more than 20 minutes to fill the same tape.

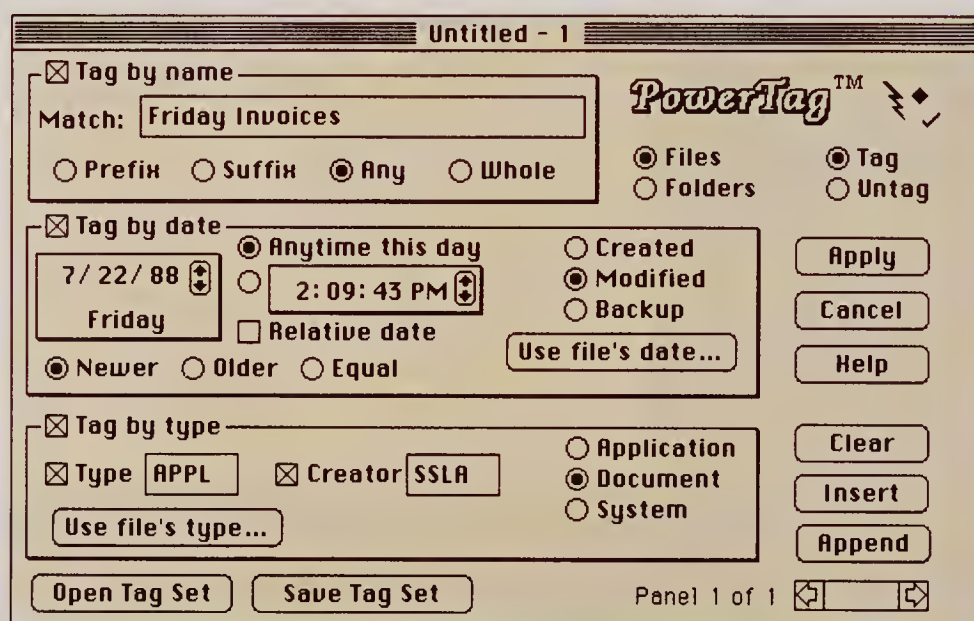
In actual use, however, speed is affected by such factors as tape retensioning and recalibration, formatting, erasing, overwriting used tapes, MultiFinder capability, timer-delayed automatic operation, type of backup performed (file-by-file or mirror), and verification procedures. For instance, the Tecmar takes 2 minutes to recalibrate and retension a tape every time you put one in the machine. Tallgrass does this in 1 minute. When you are doing a multiple tape backup with the Tecmar, and it's time to put the next tape in the machine, if you have only used tapes available, you must abort the current backup, erase an adequate supply of tape, and begin again. With the Tallgrass, you simply select automatic overwrite and continue. Yet, while formatting a tape, the Tallgrass takes over the Mac for ½ hour. The Tecmar, however, allows you to use the Mac normally, with no loss of speed, as long as you don't turn off the Mac or reboot.

Both units allow you to back up a mirror image of a disk or to back up on a file-by-file basis. They also allow you to back

(continues)

PowerTag

The Tecmar QT-Mac40 software allows elaborate file-selection routines for backup. These settings prompt the tape drive to back up files named “Friday Invoices”; modified July 22, 1988, or later; and created by Mac-Money. Insert and Append combine dissimilar sets.



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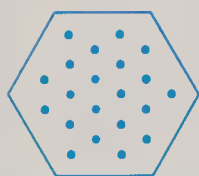
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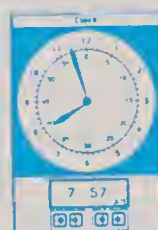


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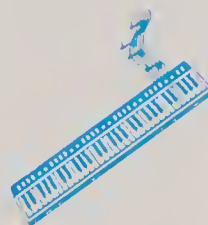
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up files according to custom criteria, such as groups of files or only files changed since the last backup. Tecmar, however, offers more selection criteria (see "Power-Tag" and "Keeping It Together"), and its image backup routine is potentially faster, since it ignores blank areas if instructed to do so. Both units can back up data from, and restore it to, floppies.

Unlike the Tallgrass unit's software, Tecmar's is MultiFinder compatible. It's arguable just how useful this is, however. If the Tecmar unit is working in the background, and you are using a CPU-intensive project in the foreground, response times slow down considerably. Similar problems occur on a network. Both manuals recommend doing backups when the networks are idle; otherwise, work nearly grinds to a halt. Both units claim compatibility with AppleShare, TOPS, and MacServe.



Keeping It Together

The Tallgrass TG-4000 uses scripts to create sets of files to be backed up. You can back up every file in the set each time you run the script, or you can back up only those files that you have changed since the last backup.

Skin-Deep

At the end of the fairy tale, we have a flawed beauty and a beast that isn't so bad after all. Most users will choose the Tecmar because of the designer case, the software's welcoming Macintosh interface, the unit's potential for speedy backups, and its MultiFinder compatibility. Others, however, will be put off by the Tecmar's lack of cables and its premium price. And some users will want the Tallgrass's delayed-timer feature. The good news is that either of these units works fine if you use it in a consistent backup routine. —Scott Beamer

See *Where to Buy* for contact information.

Symantec Utilities for Macintosh 1.0

Disk recovery utilities. **Pros:** Enables fast recovery of crashed disks; partitions and defragments hard disks; provides disk-sector editing tools. **Cons:** User interface sometimes awkward; not completely compatible with MultiFinder.

Company: Symantec Corporation. **List price:** \$99.95. **Requires:** 512KE, System 4.0/Finder 5.3 or later.



One day it will happen to you. You'll put a floppy into the Macintosh, and the following message will appear: This disk is unreadable: Do you want to initialize it? It's even scarier when that message refers to a hard disk. If you haven't had the foresight to back up your data, then the only way to resurrect it is to use a disk-recovery utility. Fortunately, Symantec Utilities for Macintosh (SUM) provides a complete set of tools for recovering files from crashed disks. It can even restore a hard disk that has been accidentally initialized.

SUM is made up of several utilities. Guardian is the main recovery application. HFS Recover, Scanner, and Floppy Recover are three programs that help you recover files on disks that have not had Guardian installed. Disk Clinic, the shell that ties the recovery utilities together, asks you a series of questions about your problem; then it selects and launches the program that

can best recover your files. Symantec Tools is an editor (like MacMaster Systems' Fedit) that allows you to view and modify the structure of disks and files. Since this editor enables you to make potentially dangerous changes to files, the company recommends Symantec Tools for experienced users only. HD TuneUp defragments files for faster performance. And HD Partition lets you divide a hard disk into separate volumes. QuickCopy is a fast duplication utility for floppy disks.

Be Prepared

The basic philosophy behind SUM is that old adage "An ounce of prevention is worth a pound of cure." You provide the prevention by installing several files on your hard disk. First copy the Shield INIT file to the System Folder. This file loads into memory when you start the Mac and serves two functions. First, Shield watches over the hard disk, protecting it from computer viruses that attack the disk directory. Second, Shield gathers the information that Guardian needs to recover a hard disk quickly if it crashes or if you initialize it by mistake.

Using Disk Clinic, you install two crucial invisible Guardian files. Guardian File Save can recover up to 100 deleted files; Guardian Volume Save can recover an entire disk in the event of a problem. The price you pay for the peace of mind these files bring is the loss of 1 percent of your usable disk space. The last step in the preventive process is to back up Guardian Volume Save onto a floppy disk.

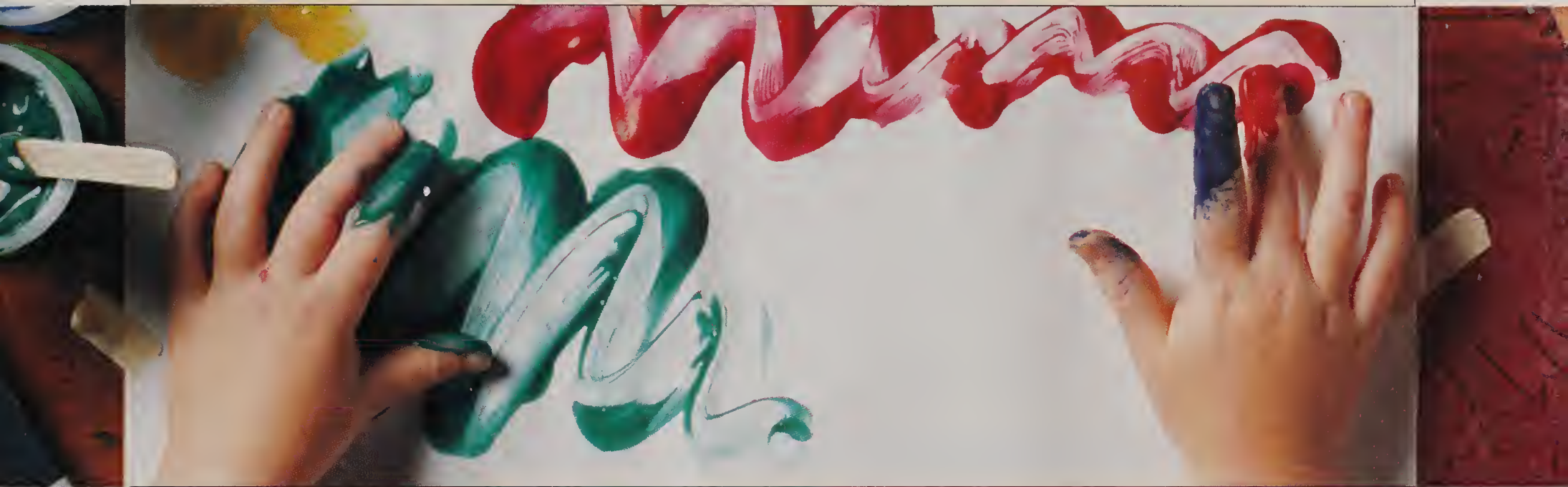
Raising the Dead

With the help of my hard disk's manufacturer, I invoked a disk crash by corrupting the disk's Volume Information Block with Symantec Tools, then pressing the Mac's reset switch. When the Mac rebooted, I got This disk is unreadable: Do you want to initialize? I inserted the floppy with the backup Guardian Volume Save file and started Disk Clinic. Choosing Recover Crashed Disk brought up a series of questions about the problem disk, which I answered. Disk Clinic then launched Guardian and asked me to locate the Guardian Volume Save file backup on the floppy via the standard Get File dialog box. Guardian read the file backup, displayed the date the backup was created, then

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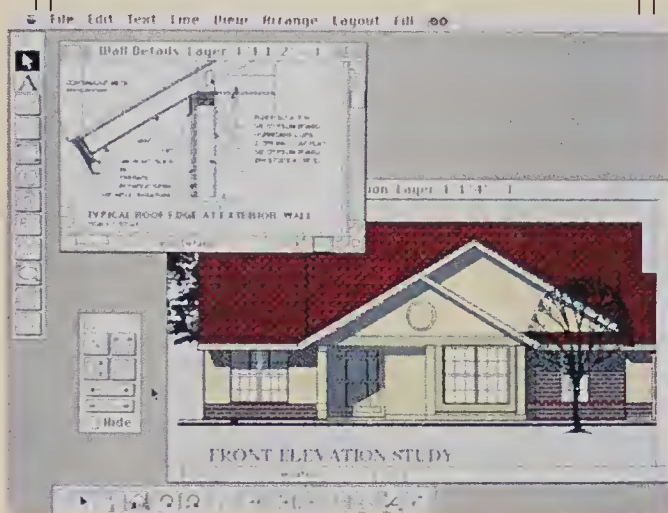
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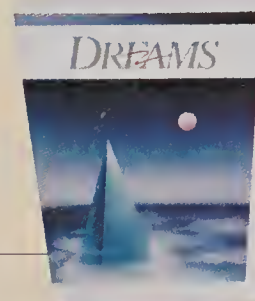


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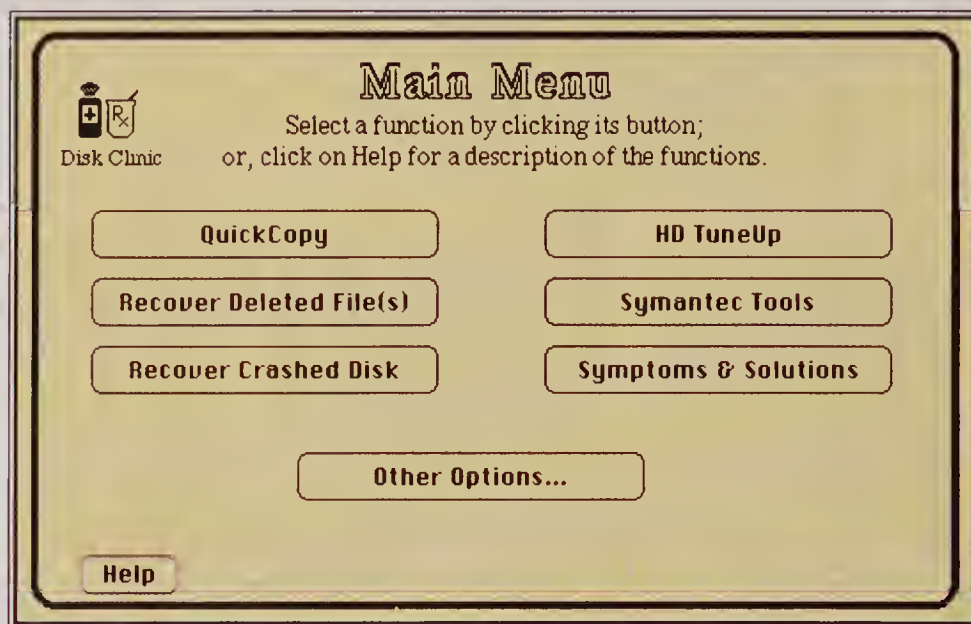
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The (Disk) Doctor Is In

Disk Clinic is a shell that diagnoses disk problems and then selects the best of SUM's many tools for the situation.



asked if I wanted to proceed. I clicked OK, and 5 seconds later Guardian reported the restoration was complete. Returning to the desktop, I rebooted, and the crashed disk mounted, with all files intact. Total elapsed time: about 1½ minutes. Wanting to see how quickly the program could recover an initialized disk, I wiped the disk using the Finder's Erase Disk command, then repeated the recovery process, with the same result. If you've installed Guardian, but don't have a current floppy backup of the Guardian Volume Save record, SUM scans the entire hard disk, looking for the file. It took about 15 minutes to scan my 20 megabyte hard disk. After SUM found the file, recovery again took just 5 seconds.

You can recover files from bad disks that haven't had the Guardian data files installed, but the process takes much longer. SUM uses HFS Recover, Floppy Recover, and Scanner first to look on the disk for files, then to recover the files on a separate pass. You can choose to recover all or just a few files. On my hard disk, the scanning pass took slightly less than 30 minutes, with the subsequent recovery of files to another hard disk taking just under 8 minutes. A larger-capacity hard disk would take additional time to scan. If you don't have a second hard disk handy to receive the resurrected files, HFS Recover puts the recovered files on floppies, splitting larger files across several disks, if necessary. You can later rejoin the split files after you repair the hard disk.

As luck would have it, a friend sent me a crashed floppy disk that wouldn't mount; the Mac kept reporting, This is not a Macintosh disk. Even though Guardian wasn't installed on the disk, I was able to recover all files from the disk in about 5 minutes, using Floppy Recover.

Adding to the SUM

HD TuneUp is a disk optimizer. Files on hard disks can become fragmented, meaning that parts of one file spread across noncontiguous sectors. It takes the Mac longer to read fragmented files. HD TuneUp collects the parts of the file and writes them into an unbroken area of the hard disk, thus improving speed. You'll probably see a significant speed increase only if your disk is severely fragmented, however.

The HD Partition desk accessory works with an INIT file you put in the System Folder. The INIT splits the hard disk into several volumes, each of which acts as though it were a separate disk. You can automatically mount a partition and assign an encrypted password. Partitions are stored as invisible files on the hard disk, and can be any size.

SUM is a revision of Micro Analyst's MacZap Utilities, and the package suffers from some of its predecessor's interface problems. The program is sometimes awkward to use and can give error messages not listed in the manual. The SUM manual is a great improvement over MacZap's manual, giving step-by-step solutions for most disk problems. Symantec does not recommend using SUM version 1.0 under MultiFinder or with a RAM cache.

Most people won't buy file recovery utilities until they have a defective disk. SUM can still help them, but those who install it before a problem occurs can be up and running again in a fraction of the time it will take the unprepared.—Tom Negrino

See Where to Buy for contact information.

Color Monitors for the Mac II

MegaTrend/2

20-inch RGB color monitor for the Mac II (640 by 480 resolution). **Pros:** Looks nice; doesn't need configuring; one-year warranty; parts and labor. **Cons:** Tendency to blur text when most windows are closed; only compatible with IBM PS/2 VGA output. **Company:** Intecolor. **List price:** \$2295, plus \$29 for Mac II cable adapter; antiglare screen (\$100) recommended. **Requires:** Mac II Video Card or compatible video card.

Auto-Sync 1019/SP

19-inch RGB color monitor for the Mac II (640 by 480 resolution). **Pros:** Switches between Mac II and IBM-compatible displays easily; supports wide range of IBM RGB input; one-year warranty; parts and labor. **Cons:** Minor visual distortion; colors somewhat dull. **Company:** Microvitec. **List price:** \$2395, plus \$34.95 for Mac II cable; antiglare screen (\$129) recommended. **Requires:** Mac II Video Card or compatible video card.



Certain applications and settings require a larger-than-normal display—not additional resolution, mind you, but the normal resolution enlarged significantly. A classroom, a trade show, or a processing control room may need a display that can be seen at a distance. On the Mac II, these large monitors typically plug into the Mac II Video Card (or compatible equivalent), showing the normal 640-by-480 resolution on a 19-inch or 20-inch screen. Two such RGB (red-green-blue) monitors for the Mac II are the MegaTrend/2 from Intecolor, and the Auto-Sync 1019/SP from Microvitec. Both of these monitors can be used with IBM PC or PS/2 compatible systems.

The MegaTrend/2

The MegaTrend/2 provides a 20-inch screen, resulting in a 60 percent increase in image and text size. Setup is easy. A single cable, built into the monitor itself, plugs into the Mac II Video Card. Unlike other multisync monitors, this one doesn't require you to fiddle with settings in the back. However, it has a small adapter (sold separately for \$29) that fits between the regular cable and the Mac II. The regular

(continues)

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cable has a DE-15 male connector, which plugs directly into the IBM PS/2 (VGA) video-output port (replacing the IBM 8512 and 8513 monitors). The monitor supports and automatically configures itself for all 17 VGA modes, including CGA and EGA, as well as for the Mac II.

Physically, the monitor is more appealing than most other large monitors for the Mac II. It's lighter and slimmer than the Sony 19-inch and offers clearly labeled controls in the front for power, brightness, contrast, and degaussing. (Accidental exposure to magnetic fields can cause the monitor's screen to show distorted colors; the built-in degausser demagnetizes the screen and eliminates those distortions.) It has a built-in swivel stand, which can be removed, but the monitor isn't designed to sit on a surface without it. The stand's footprint is small (13.5 inches wide by 12.7 inches deep), but the monitor itself is 20 inches deep by 19 inches wide by 19 inches high (with the stand). The MegaTrend/2 is also available in rack-mount, console-mount, and industrial-strength versions that conform to National Electrical Manufacturers' Association standards.

A Pair of CRTs

The MegaTrend/2 and the Auto-Sync 1019/SP present a larger-than-normal Mac II display, readable at a distance.



MARK JOHANN

The display is clear, steady, and mostly free of visual distortions. Also, the monitor has a feature designed to automatically adjust the screen's brightness for you, based on what's currently being displayed. Unfortunately, one side effect of this feature is that if you have only one or two small windows open, the monitor overcompensates by increasing the brightness, and text appears blurred. You can avoid this problem by keeping the contrast turned down (or by keeping your windows open). The phosphor used in the monitor is "fast," that is, has limited persistence, so there is little blurring during animation. The phosphor color is light gray with a slight greenish tinge (as opposed to dark gray for the regular Apple monitor). The convergence test (which you can invoke from the monitor's panel in the Control Panel DA) gave straight white lines, indicating that the three electron guns used by the monitor are tightly aligned. The monitor I reviewed had the optional antiglare coating (\$100); I recommend it, unless you are getting one of the touch screen options (they have their own antiglare filters).

Auto-Sync 1019/SP

The Auto-Sync 1019/SP monitor with its 19-inch display gives you a 50 percent increase in image and text size. Two cables are necessary: one for connecting with a PC compatible, the other (which you have to purchase) for hooking up to the Mac II. Installing Auto-Sync's optional tilt/swivel stand is a matter of fastening two screws.

Auto-Sync isn't much of a beauty. It's a bit bigger than the MegaTrend/2 and doesn't look nearly as nice. On the other hand, it has several controls in front, including brightness, contrast, degaussing, video source select, vertical size and position, and horizontal size and position. The power switch is in the back, as are separate

ports for TTL and analog input and a switch for selecting TTL input type.

The video select switch lets you have both a PC-compatible and a Mac II running and hooked up to the monitor at the same time; you can switch back and forth between the two displays. This worked fine for me, first with a Zenith Z-181 laptop, then with a Compaq 286 portable and my Mac II. The only problem was that the display's horizontal position shifted between the Mac II and the PC, but I found a compromise setting using the horizontal position knob on the front.

The display was clear and steady with only a tiny amount of indentation on the upper left edge of the picture, and there was no blurring of text or images. I found one significant problem, though: the monitor Microvitec sent me for review had no antiglare coating on the screen, so the display clearly reflected any well-lit objects in the background. However, you can have an antiglare screen installed (in the factory) for an additional \$129. Also, colors looked a little washed out compared to the MegaTrend/2, the AppleColor RGB monitor, and the Sony 19-inch. The convergence test I performed showed a hint of color separation, but nothing significant.

Test before Buying

Both these monitors are smaller and easier to handle than the ElectroHome and Conrac monitors; in fact, both can fit on top of a Mac II, though you probably should avoid leaving one there for long periods. Both warmed up quickly. Neither monitor had any noticeable flicker, and there was no apparent interference from either the Mac II (both were tested sitting on top of it) or from an adjacent Sony 19-inch RGB (plugged into a second video card). Of the two, I preferred the MegaTrend/2, because of display quality, physical appearance, and lower cost; however, I considered the auto-adjusting brightness a bug, not a feature. Auto-Sync 1019/SP, on the other hand, didn't look as nice, and its display quality was a shade behind that of the MegaTrend/2, but the specialized features (such as selecting between different video inputs) may be useful in certain settings. As always, if you're buying yourself a monitor, you should test it out first, or at least be sure you have a money-back guarantee.

—Bruce Webster

See *Where to Buy* for contact information.

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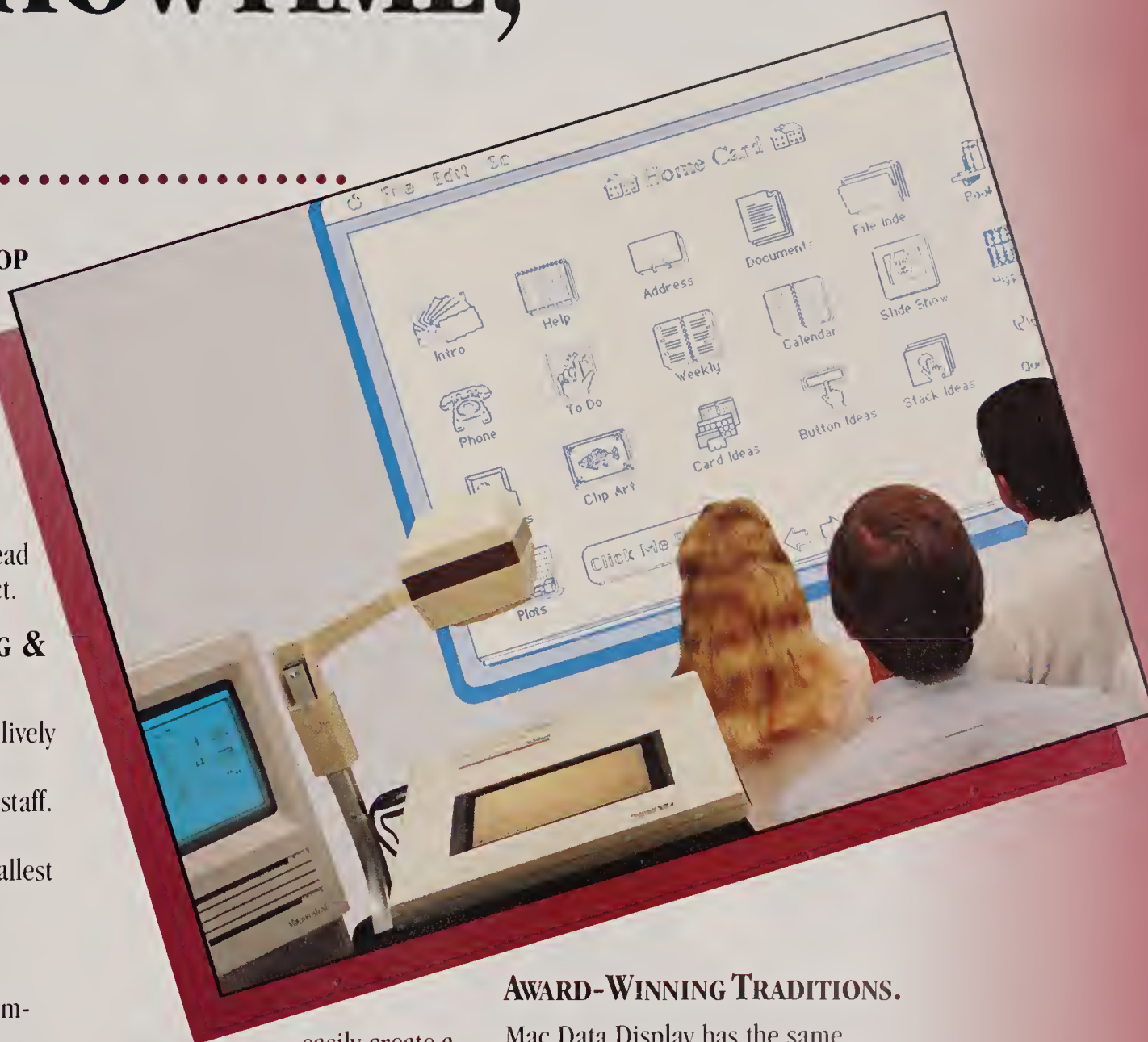
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Although it's easier to steal a few megabytes of data than, say, a file drawer full of paper, there are fewer secured microcomputers than there are locked file cabinets. If you want to protect electronically stored data, you have three basic choices: hardware security, password protection, and encryption.

Hardware Security

For many situations, controlling access to hardware is the easiest and most direct method of protection. Simply bolting the door to your office with an ordinary lock can be effective, or you may opt for a superlock such as the Ridge Reader MINT fingerprint-pattern reader from Finger-matrix (\$1300 to \$3300). If you need to leave your office open, you might consider insuring your system with a company that specializes in microcomputer insurance such as Safeware (from The Insurance Agency). Insurance costs \$69 dollars a year for up to \$5000 of coverage, which in-

by *Lawrence Stevens*

cludes everything from theft to power spikes to damage from dropping the computer.

Whether or not you have insurance, there are a number of products available to help keep your computer and its data where they belong. The Muzzle (\$69.95 Ergotron) for the Mac SE is the most complete access-control system reviewed here; it is the only one that prevents people both from using the Mac and from walking off with it. The Muzzle surrounds the Mac like a tight metal belt and looks a bit like a dog muzzle. It covers the floppy drive slot in the front of the machine and the power cord hole in the back. You can attach the unit to a cable that anchors the Mac to anything in your office that doesn't move easily. To install The Muzzle, remove the Mac's power cord and slip The Muzzle around the computer, using the supplied padlock to attach it to the security clip on the back of the SE.

One version of The Muzzle has a hole through which you can reinstall the power cord after you've placed The Muzzle on the computer. In theory this allows users to view and alter files on the hard disk but not to upload or download to a floppy disk. But because this doesn't prevent someone from attaching an external floppy drive to the Mac, this version of The Muzzle has limited uses.

Another security product, Padolock (\$69.95, Doss Industries), has one plate that installs on the bottom of the Mac and another that goes on top of your desk. You attach the plates with—believe it or not—stickum, an acrylic adhesive that, according to the manufacturer, holds with over 10,000 pounds of resistance to force. The plates lock together, securing the Mac to the desktop. Unlike The Muzzle, which works only with the SE, the Padolock works with

any Mac, although you need a separate Padolock for each component, such as an external hard drive or a monitor.

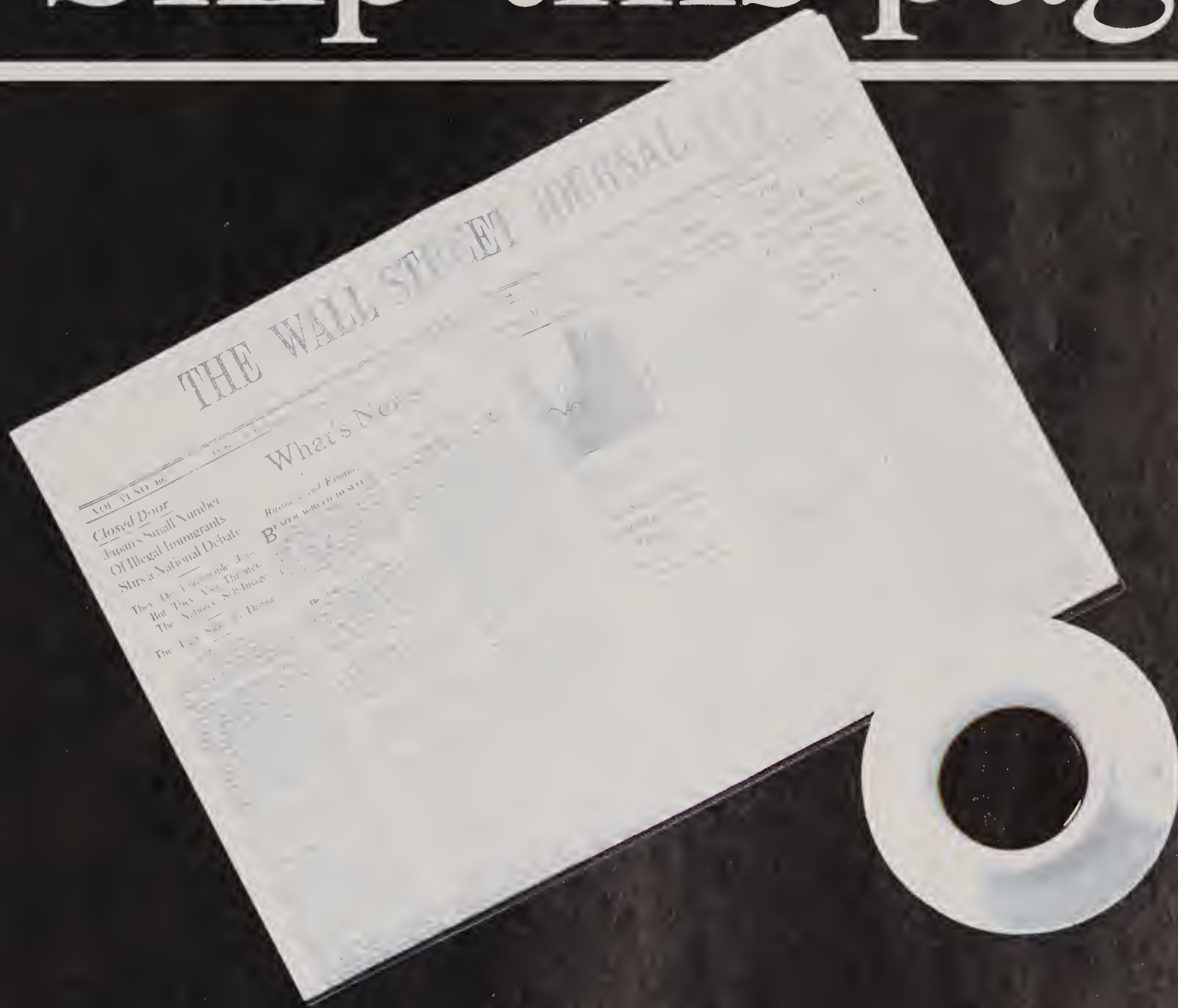
MacKablit (\$39.95, Secure-It) and Mac Lock Security Kit (\$49.95, Mac Products) both come with a piece of hardware that you attach to the security slot in the back of any Mac (except the Mac II). The kits also include a cable that runs from the Mac to some convenient area of a table (such as around the leg) or to some other similarly solid piece of equipment. Once you've attached the piece of hardware to the security slot, you can remove it only by opening the Mac's back; so installation is semipermanent.

The Muzzle does an excellent job of preventing access to the Mac, and the fact that it can do double duty by tying down the machine is an added bonus. But don't buy this product just to prevent the Mac from being stolen—attaching and removing The Muzzle (which must be done every time you use or lock up the Mac) is cumbersome, involving lifting the Mac and inserting or removing the power cord. For securing the Mac to the desk, I would choose the Padolock System. It doesn't use a cable (which tends to make the Mac look a bit like a bike tied to a bike rack), and it's the most secure since it has an internal lock that can be removed only by drilling or picking. All the other systems use padlocks and cables, which someone can clip off with the right tools. But if you feel squeamish about putting adhesive on your Mac or desk, MacKablit and Mac Lock are about the same, except that the former has a slightly thicker cable.

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Password Protection

Password protection is a type of access control that prevents intruders from accessing stored data—normally on a hard disk. Password protection does not, of course, prevent a hard disk from being stolen, but it does prevent a stolen hard disk from being read. This protection is normally so secure that if you forget the password, your only option may be to erase the protection, along with all your data, using a strong magnet. Password protection does not guard data that is telecommunicated or sent through a network. If you need to secure transmitted data, you'll have to use an encryption program. On the other hand, it takes a lot less time to secure a hard disk with a password than to en-

with a special User Disk (which contains a System file) and type in an authorized name and password. The Mac then automatically ejects the User Disk and restarts. This system provides a high degree of protection since it takes two security breaches—the password and the User Disk—for an intruder to gain access to the hard disk.

The key to the program is the Administrator Disk, which comes with a "signature" that only your program can read (for security reasons, Kent Marsh does not keep a record of signatures). The Administrator Disk allows you to override the program (in case you forget your password or your User Disk becomes dysfunctional), create User Disks, authorize or delete users, and assign or change passwords.

As long as the Administrator Disk is not stolen, The NightWatch provides as much security as most people need. If all your data is contained on hard disks, and it is not sent through telecommunications media, this is the fastest and most convenient way to protect it.

Data Encryption

Data encryption has the advantage of being portable and selective—you can protect data on floppy disks and data sent over phone lines, and you can protect some files on a disk, leaving others unprotected. The only disadvantages are that it takes longer to encrypt individual files than to lock a hard disk, and encryption usually expands the size of the files.

I first encountered encryption in the form of the coded message displayed at the end of every Captain Midnight episode. To decrypt the message you needed a decoder badge that substituted letters: X for D, Z for R, and so on. Though (with all due respect to the Captain) simple substitution codes can easily be broken by cryptographers, virtually all encryption systems use some—more complex—form of letter substitution or scrambling algorithm.

Sentinel (\$295, SuperMac Technology) is the most comprehensive encryption program reviewed here. It gives you a choice of three encryption methods, DES, BlockCrypt, and SuperCrypt. DES (Data Encryption Standard), created for the U. S. National Bureau of Standards, at one time was considered unbreakable. DES has since been broken, but experts say it takes a couple of weeks with a dedicated mainframe to break a code created with DES. If you

need more security than that, I'm sure you know a lot more about cryptography than I do. BlockCrypt is based on DES, but BlockCrypt puts the text through only about one-quarter of the mixing. SuperCrypt is the least secure, but it is satisfactory for most users. The more secure the encryption method, the longer it takes to encrypt a file. For instance, Sentinel encrypts data at about 2K a second in DES and in about one-sixth that time in SuperCrypt.

Not only is Sentinel comprehensive, it is also extremely convenient to use. You can select more than one file at a time for encrypting or decrypting, and you can launch applications from Sentinel. For straight encryption, Sentinel is the best package I've seen.

However, P/C Privacy (\$95, MCTel) and Packer (\$29, Bobbing Software) have unique features that make them better for specific applications. One of P/C Privacy's strongest features is that it allows you to purge the original file, removing all traces of it. (A trashed file is deleted from the directory, but it isn't erased until it's overwritten later.) The program also has two features that make it especially useful for data transmission. First, you can save encrypted files as data only, so you can transmit them to noncompatible hardware or software. Second, the program provides a feature that helps you determine if the received file is the same as the sent one.

Packer compresses files so they take up less space on a disk while at the same time optionally encrypting them. On a Microsoft Word file, for example, Packer reduced disk space by almost 50 percent. Packer is primarily a compression program and secondarily an encryption program, since you can "pack" without encrypting but not vice versa.

Choosing among the three encryption programs is a matter of deciding which features you want. But based just on the strength of the encryption method, Sentinel is your best bet. P/C Privacy rates second because it allows you to encrypt a file as many times as you want (you have to decrypt files as many times as you encrypt them, however). And Packer comes in last since it allows you to encrypt a file only once. □

See *Where to Buy* for contact information.



MARK JOHANN

The Muzzle surrounds the Mac SE, covering both the floppy-drive slot in the front and the power-cord hole in the back. A cable secures The Muzzle (and the Mac) to a desk. Not only can The Muzzle keep people from using your Mac, but it also can prevent them from walking out the door with it.

crypt individual files. And with password protection, intruders cannot read your files, they can't even see your directory, and they can't plant a virus on your hard disk.

The NightWatch (\$149.95, Kent Marsh) is a comprehensive and secure hard disk password system. When you lock a hard disk with The NightWatch, the disk's icon does not appear on the Finder. To access the hard disk, you have to start the Mac

Abaton Scan 300/S

Create your best image.



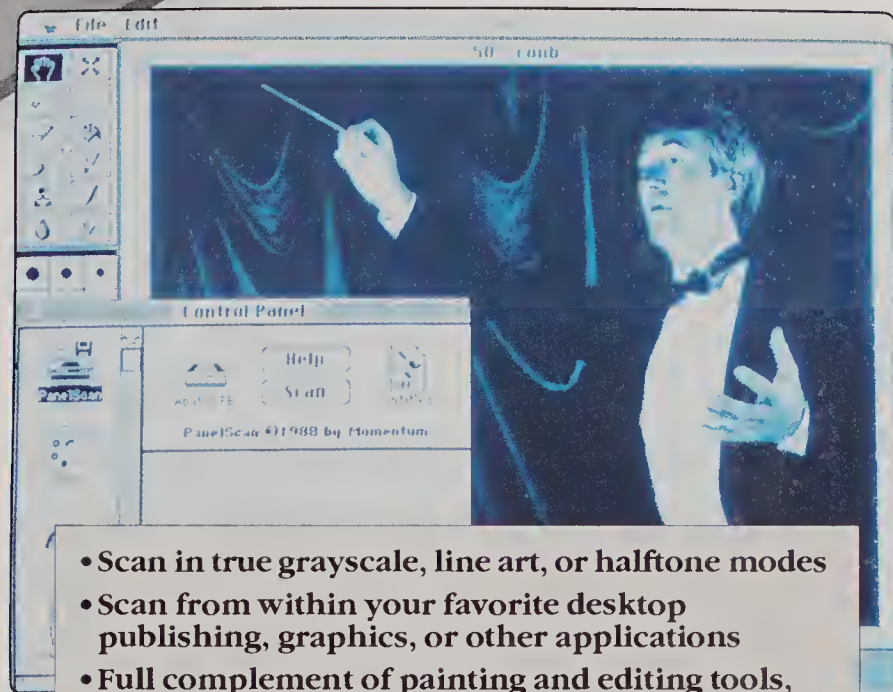
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Hyper Polygon • Smooth Polygon • Pen Tool • Line Tool •
Parallel Line • Rectangle • Freehand Tool • Arc Tool • Paint
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Lighten Selection Command • Auto Text Wrap • Selectable
Text Style Attributes • Text Alignment • Margin And Tab

Introducing Cricket Paint.



We've been asked why Cricket Software would introduce a black and white paint program when the whole world is making so much noise about color. Frankly, we feel it's obvious: There are more than 1.5 million* monochrome Macintosh® users — Apple® hasn't abandoned them and neither have we. Plus, we felt there was still a lot of room for improvement over the current best selling paint program.

So, we revved up our monochrome Macintoshes in the best Cricket Software tradition and developed the new standard: Cricket Paint.

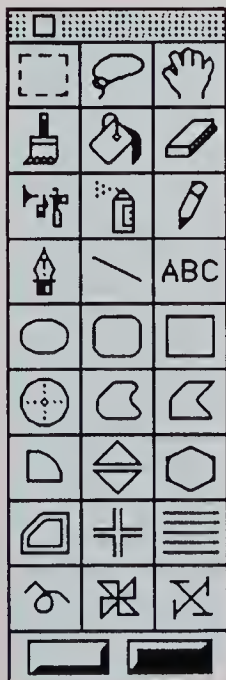
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Cricket Paint is loaded with features. Powerful



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16

Worksheet1

	A	B	C	D	E	F
1	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
2	\$56.00	\$6,584.00	\$65.00	\$56.00	\$8.00	\$98,416.00
3	\$51,651.00	\$65.00	\$465.00	\$6,512.00	\$65.00	\$61.00
4	\$651.00	\$654.00	\$321.00	\$6.00	\$84.00	\$6,265.00
5	\$9,684.00	\$654.00	\$6.00	\$651.00	\$6.00	\$636.00
6	\$6,565.00	\$65.00	\$23.00	\$6.00	\$5,198.00	\$6,548.00
7	\$5.00	\$9.00	\$505.00	\$85,146.00	\$1.00	\$1.00
8	\$6.00	\$2.00	\$23.00	\$321.00	\$321.00	\$6,941.00
9	\$654.00	\$85.00	\$5,643.00	\$682.00	\$5.00	\$65.00
10	\$6.00	\$1.00	\$595.00	\$6.00	\$63.00	\$846.00
11	\$8,984.00	\$8.00	\$2,059.00	\$1.00	\$51.00	\$51.00
12	\$65.00	\$5.00	\$35.00	\$54.00	\$635.00	\$9.00
13	\$65.00	\$1,549.00	\$7.00	\$65.00	\$158.00	\$51.00
14	\$356.00	\$5.00	\$5,512.00	\$1.00	\$1.00	\$9.00
15	\$654.00	\$1.00	\$692.00	\$651.00	\$54.00	\$59.00
16	\$99.00	\$6,549.00	\$635.00	\$5,618.00	\$65.00	\$8.00
17	00	\$25.00	\$92.00	\$654.00	\$50,196.00	\$651.00
18	00	\$1.00	\$5.00	\$51.00	\$516.00	\$98.00
19	00	\$6.00			\$51.00	\$51.00
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Circle 586 on reader service card

New Products

Information on the Mac's latest software, hardware, and accessories

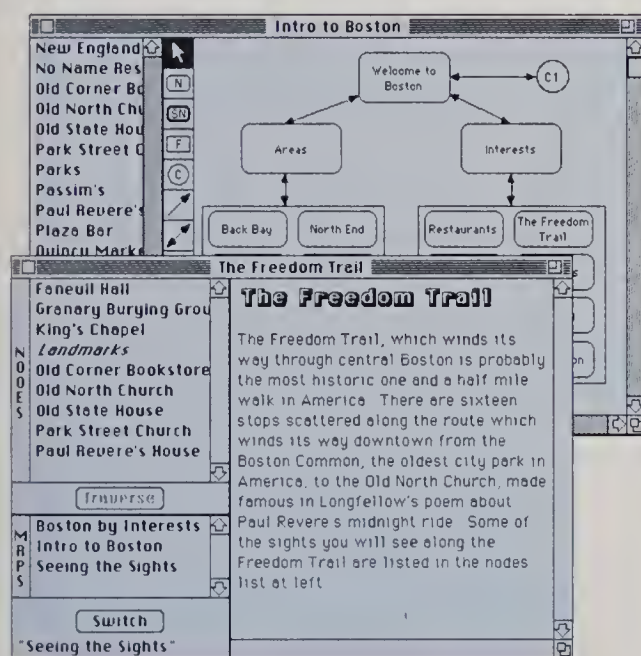
Edited by Mary Margaret Lewis

This section covers Macintosh products formally announced but not yet evaluated by Macworld. All prices are suggested retail. Please call vendors for information on availability.

SOFTWARE

Acknowledge Software tool kit that opens up remote computer services by providing tools to communicate with mainframes, minicomputers, and personal computer networks. Offers ability to create Connections or applications that can tie the Mac into any telecommunications environment. 512K min. memory. \$495. SuperMac Software, 415/964-9694.

ArchiText Text retrieval, management, and presentation program. Bitmapped graphics are entered and stored in subdocuments, called nodes, which may be linked. Comes



ArchiText



Chuck Yeager's Advanced Flight Trainer

with a free read-only Viewer application that allows for control of access and path to nodes and maps. 1MB min. memory. \$349.95. Brainpower, 818/884-6911.

Chuck Yeager's Advanced Flight Trainer

Mac II flight-simulation program, equipped with Flight Recorder that takes student through stages of becoming a first-rate pilot. Supports 16-color, full-screen graphics, and three levels of on-screen instruction from General Yeager. 512K min. memory. \$49.95. Electronic Arts, 415/571-7171.

Data Scan Image processing software with the ability to recover numeric data from printed graphics, and to quantify bar charts, area charts, and various scientific plots such as log/log, log/linear, and linear plots. Analyzes bitmaps in MacPaint, uncompressed FOTO, Thunderscan, or TIFF format. May be used in conjunction with a scanner. 512K min. memory. \$199.95. Brainpower, 818/884-6911.

Finale Integrated notational program that allows for playback and printout. Provides seven methods of inputting music, including HyperScribe and Transcription Mode. Supports complex meter signatures, stan-

dard and nonstandard key signature, and nested tuplets. Analyzes chords and creates chord suffixes. 1MB min. memory. \$1000. Coda Music Software, 800/843-1337.

FlashCrypt Data security applications that offer file and folder encryption using Data Encryption Standard method. Allows you to save files and folders for encryption or decryption as a group. 512KE min. memory. \$295.95. Magnus Corporation, 206/467-5738.

Generic CADD Level 1 CADD tool that enables you to edit multiple drawings in separate windows simultaneously. You can cut



Finale

and paste objects between different windows within the program, and between CADD Level 1 and other programs using standard PICT format. 1MB min. memory. \$99.95. Generic Software, 206/885-5307.

Gofer Text search program that provides search, find, copy, and paste functions with no need for indexing or file conversion. Performs searches as a background function using keyword clue. Allows you to

(continues)

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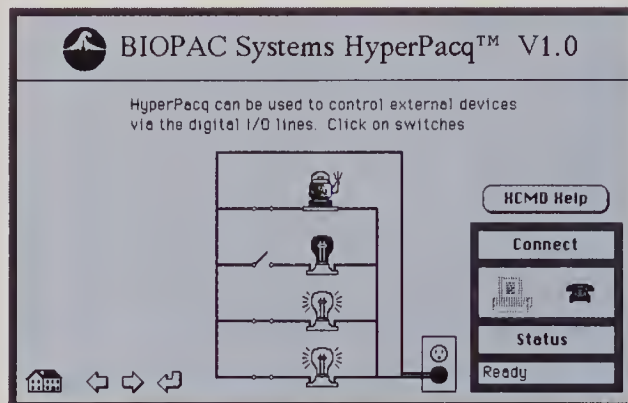
Gofer

paste the items Gofer finds directly into CompuServe or MCI Mail messages. 512KE min. memory. \$79.95. Microlytics, 716/377-0130, 800/828-6923.

HyperLibrary Reference tool designed for students from kindergarten through twelfth grade. Provides biographical information, description of Dewey decimal system, online help, and an online notes section. Based on a customizable HyperCard stack. 1MB min. memory. \$15 plus \$2 s/h. Friedman Computing & Publishing, 813/924-3238.

HyperPacq HyperCard interface for data acquisition on the Mac. Works in conjunction with MacPacq data acquisition hardware. Provides complete scripting access to the stack. Can be modified for individual experiments. 512K min. memory. \$95. Biopac Systems, 805/967-6615.

Language Systems FORTRAN Compiler Intended for scientists and engineers. Supports SANE floating-point routines, a wide range of data types, and ANSI Standard FORTRAN 77, plus extensions. Also runs



HyperPacq

on MPW environment. 1MB min. memory. \$295. Language Systems Corporation News, 703/478-0181.

MacAuto Provides analysis of spectral data for scientific publications; includes curve-fitting of Gaussian and Lorentzian peaks, and ability to create high-resolution figures. 512K min. memory. \$299. Spectral Software, 415/321-1345.

MacMED Uses more than 250 integrated features, plus a differential diagnosis tool, to ascertain possible diagnoses. Runs on the Mac Plus, SE, or II with hard drive. Written in Pascal, C, and assembly language. 1MB min. memory. Introductory price is \$2500; trial system \$250. JAM Technologies, 415/442-0795.

MacNet Networking application that provides access to Connect's PC network services. Features include icon-based electronic mail, link to Standard and Poor's market quotes, custom bulletin boards and forums, online access to Macintosh product information. 512KE min. memory. Basic

(continues)

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Setting new standards.

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In today's market of 50 megabytes and beyond, backup is becoming essential. The Nova T60, our latest product advancement, is a 60 megabyte tape backup system designed strictly for the Macintosh. With the Nova T60 you are not restricted to the *standard* backup routines. Backup capabilities are virtually unlimited with the reliable, easy-to-use Nova T60. All you need is an imagination ... and a Macintosh.

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*The five year limited warranty is available on hard disk drives only, manufactured by Microtech International, Inc. and must be sold and delivered in the United States or Canada. Certain restrictions and exclusions apply. Terms and conditions of the five year limited warranty are available upon request. The Nova T60 has a two year limited warranty.



New Products

20 ID pack \$999; single evaluation unit \$49.95; plus connect charges. National Instruments, 408/973-0110.

Mac II Solitaire Royale Game combining Mac II's sound capabilities, 256-color range, eight versions of solitaire, and a menu of children's games to create family-style entertainment. 1MB min. memory. \$34.95. Sphere, 415/522-3584.

McClint C programming support tool that supports unlimited number of source files. Performs incremental syntax checking, user-selected error/warning message reporting, batch and interactive operation; provides support for C compilers. 1MB min. memory. \$99.95. MMC AD Systems, 408/263-0781.

MiniFans Database for managing contacts, customers, and sales leads. Requires 4th Dimension (complete or runtime versions, System 4.1 or higher). 1MB min. memory. \$20. Acius, 408/252-4444.

My Executive Office Home office productivity tool that includes desktop design tool to create business and office forms; data-

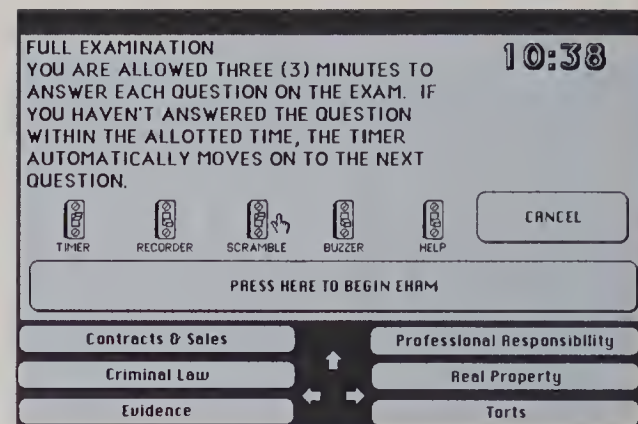
base tool to help manage forms, reports, and worksheets; word processor; and an electronic worksheet for spreadsheets. 512K min. memory. \$195. DataPak Software, 818/905-6419.

Nvelope Envelope and label printing program with built-in address list and zip coding. Handles variety of envelope and label sizes. Composes and prints index and Rolodex cards. 512K min. memory. \$69. Paul Mace Software, 503/488-2322.

OmniPage Program allows scanners to recognize pages containing mixture of images, sizes, and type fonts. Allows you to



OmniPage



Para Mason's Bar Review Series

merge scanned items with spreadsheets and databases, and save them in MacWrite format. Automatically differentiates between images and text. 4MB min. memory. \$795. Caere Corporation, 408/395-7000.

101 Scripts and Buttons for HyperCard

Extends capability of HyperCard by adding such features as an animation recorder, Hypertalk tune recorder, new browsing tools, embedded games, and a button to add new items to Apple DA menu. 1MB min. memory. \$69.95. Macropac International, 408/996-8143.

(continues)

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2400 B. Modem	159.00
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We bought a Nova external hard disk drive from Microtech based upon a recommendation from a fellow architect. A number of employees use it for numerous applications: from accounting, to word processing, to graphics; and the one thing we know is...*we can count on it!*

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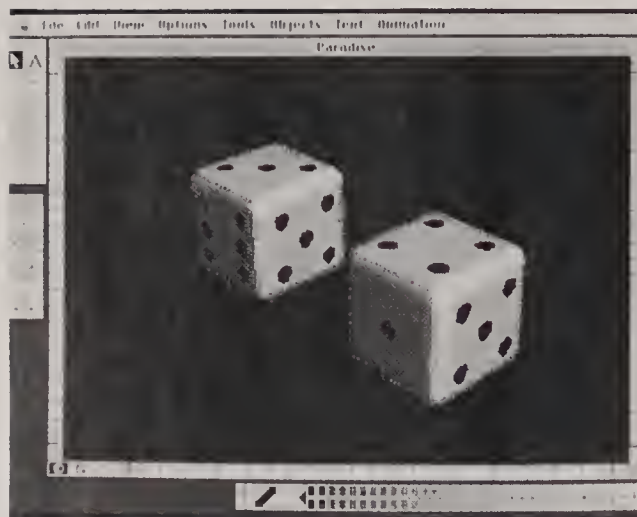
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N111

New Products



Super 3D

Para Mason's Bar Review Series

Supplementary learning tool uses HyperCard stacks to familiarize students with question format of the multistate bar exam. Six modules contain at least 200 multiple-choice questions per subject with explanatory answers. 1MB min. memory. \$59.95 per module; complete set \$295. En Fleur Corporation, 919/833-7551.

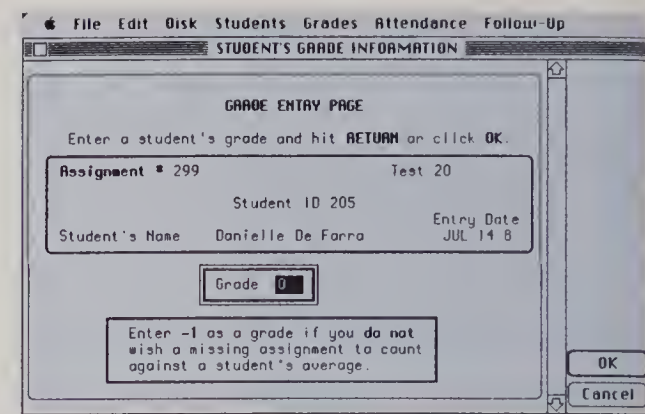
Readstar II Plus OCR package reads typed and typeset characters at constant or proportional pitch, including unconventional

characters. Recognizes up to 9000 characters per minute, depending on processor and scanner. Operates in three modes. Compatible with most desktop scanners and a variety of word processing and desktop publishing programs. 2MB min. memory. \$4500. Inovatic, 703/522-3053.

StatView SE+Graphics Low-end statistical analysis for the Mac Plus and SE. Provides MacDraw-like tools, pattern fills, user-definable axes, and mini text-editor. Includes all Plus/SE-supported features of StatView II and StatView A/UX. 1MB min. memory. \$399.95. Abacus Concepts, 415/540-1949.

Super 3D Three-dimensional modeling and animation software. Allows objects drawn in 2-D for modeling and animation to be transformed into 3-D. Changes to a model can be recorded frame by frame or imported from a text file and played back at user-controlled frame rate. 512KE min. memory. \$295. Silicon Beach Software, 619/695-6956.

Teacher's Rollbook Records grades, student attendance, behavior, special occasions, student birthdays. Also calculates averages, and keeps track of checkout and return of



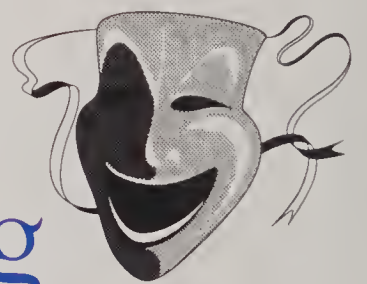
Teacher's Rollbook

library items. Requires two 800K disk drives or hard disk. 512K min. memory. \$149. Current Class Productions, 213/326-4246.

The NightWatch Prevents unauthorized access to, or erasure of, hard disks. Tracks attempts to unlock disk, supplies report of user names and passwords tried. Protects file containing authorized passwords with the American National Standard for Data Encryption. 512K min. memory. \$149.95. Kent Marsh, 800/325-3587.

(continues)

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7 Reasons Why Tecmar Tape Backup is Vital if You Own a Mac Hard Disk.

1. Why do you think they call it a hard disk?

Hard disks are great for storing data, but they're, well—hard.



Hard to handle. Hard to protect. Hard to transport data and software. You get the picture.

Tecmar's QT-Mac40™ makes owning a hard disk easy. This 40MB tape drive protects your data from human and mechanical failure; lets you remove, yet save, files from your hard disk; lets you send large amounts of data across country overnight; and even organizes all files under an easy-to-use, menu-driven format. That's a hard disk management system.

2. More than Apple® compatibility—interchangeability.

Apple selected the 40MB QIC100 tape format using DC2000-size cartridges for its own tape system, so to be compatible you must have a tape backup system capable of reading and writing in this format.

The QT-Mac40 can. In fact, the QT-Mac40 is so compatible with Apple's own tape system that you can use a QT-Mac40 to write to a tape, put the tape in an Apple system and restore the data to a hard disk, and vice-versa.



3. Faster than a speeding Apple.

Compatible, but better! The QT-Mac40 is more than twice the speed of Apple's tape backup. So, you can back up an entire 40MB hard disk in just 16 minutes—it takes 40 minutes with Apple.

4. Portability for sharing.

QT-Mac40's compact, free-standing design makes it easy to move from Mac to Mac or to a chain of SCSI peripherals for sharing. It's so small that it even fits in most briefcases.

5. Superior software.

Using the Mac's familiar, easy-to-use icon-oriented software interface, the QT-Mac40 requires no special training.

And, the QT-Mac40 has many software features that simply aren't available with any other unit, such as our exclusive PowerTag™ software that lets you selectively tag only the files that have changed for backup. And a background backup mode that lets you back up while using the Mac.

6. Experience makes the difference.

As the leading tape backup supplier for all personal computers, with over 100,000 units in the field, no one—not even Apple—can match our experience and engineering know-how. Maybe that's why we're able to give you a two-year warranty. And, if you have a problem in the first six months of ownership, we guarantee a replacement within 48 hours.

7. Experts agree.

Ric Ford—MacWEEK: "Our experience with the QT-Mac40 was quite positive. The hardware is solid, attractive and compact. It proved fastest among the DC2000 units..."



Tecmar's QT-Mac40 vs. Apple's 40SC™	Apple's 40SC	Tecmar's QT-Mac40
Speed	1MB/min.	2.5MB/min.
Portable	No	Yes
Warranty	90 days	2 years
Experience in Tape Backup	None	4 years
Price	\$1,495	\$1,395

John Rizzo—MacintoshToday: "I recommend the Tecmar QT-Mac40 for its speed, portability, quality of construction and software interface."

Shop and compare. Read the reviews. Then buy Tecmar's QT-Mac40. There's lots of reasons. Call us today for information at (800) 624-8560.

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Timecode Machine Desk Accessory Software for controlling the Timecode Machine, SMPTE-to-MIDI converter. Offers capacity to stripe a tape with any format of SMPTE, test an existing track of SMPTE time code, display current setting of the DIP switches on Timecode Machine or display the version number of the ROM software. Includes online help. 512KE min. memory. \$300. Opcode Systems, 415/321-9034.

TML Pascal II for the Macintosh Native-code Pascal compiler. Runs under Macintosh Programmer's Workshop shell; supports objects, MacApp, 68020/68881 code generation. Integrates code with other MPW languages. Compatible with MultiFinder. 1MB min. memory. \$125. TML Systems, 904/636-8592.

Virus First Aid Virus-free collection of public domain and shareware news, information, and programs concerning viruses. Eight utilities for detecting and eliminating a virus included along with documentation. 128K min. memory. \$6 plus \$1.50 s/h. Shenandoah Mac User Group, 703/433-8402.



Apple Laser Scanner

HARDWARE

ADB Mac 'n Touch Screen Touch screen for Mac SE and II; compatible with Apple Desktop Bus, HyperCard, and Mac software. Comes with driver software, controller card, and 9-inch glass sensor for Mac SE. \$695. Microtouch Systems, 617/935-0080.

Apple Laser Scanner Capable of flatbed scanning a range of document sizes; records images from bound documents; reduces distortion in scanned images. 300 dpi for desktop publishing, 200 dpi for

Group 3 facsimile, and 75 dpi for quick-scan feature. Allows high-speed data transfer between scanner and Mac. Ability to daisy-chain up to six additional SCSI devices. \$1799. Apple Computer, 408/996-1010.

Business LaserPrinter 300 dpi printer runs Adobe PostScript (version 49) with 2MB of RAM, AppleTalk compatibility, and a SCSI port for hard disk font-storage. Adds four Helvetica Condensed fonts to standard PostScript set of 35. Expandable RAM up to 4MB. \$4199; upgrade \$2299. General Computer, 617/890-0880.

CAD/CAM Monitors GDM-1601 and GDM-1602 16-inch (at 0.26 dot pitch) and GDM-1953 19-inch (at 0.31 dot pitch) Trinitron monitors. Include vertically flat screens and square-cornered image display areas. 16-inch \$3095; 19-inch \$4195. Sony Corporation of America, 212/418-9427.

Colorfreeze-24 24-bit Video Digitizer board for Mac II. Provides full-color capture of standard NTSC composite video signal triggered by software or external

(continues)

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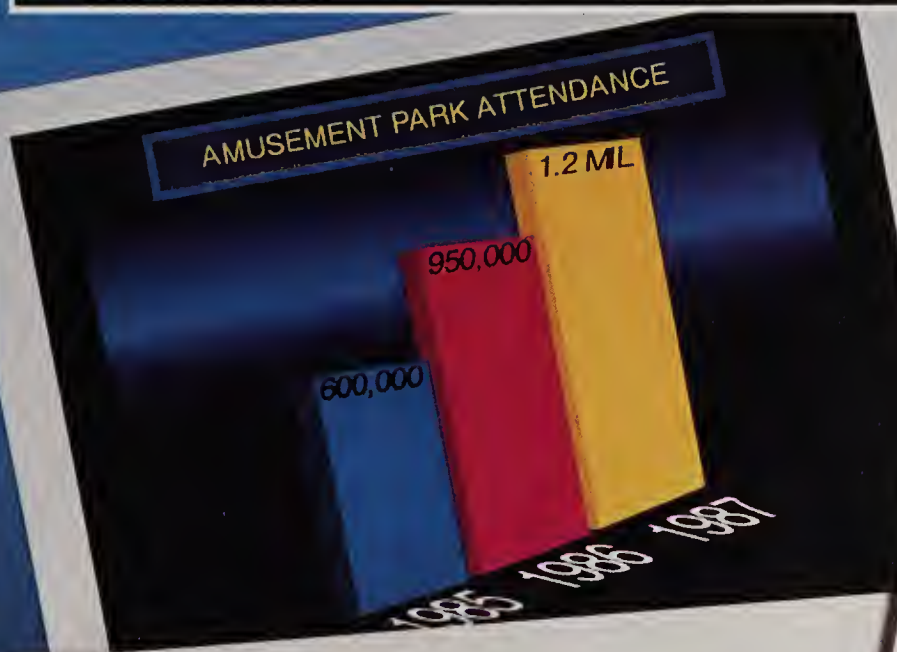
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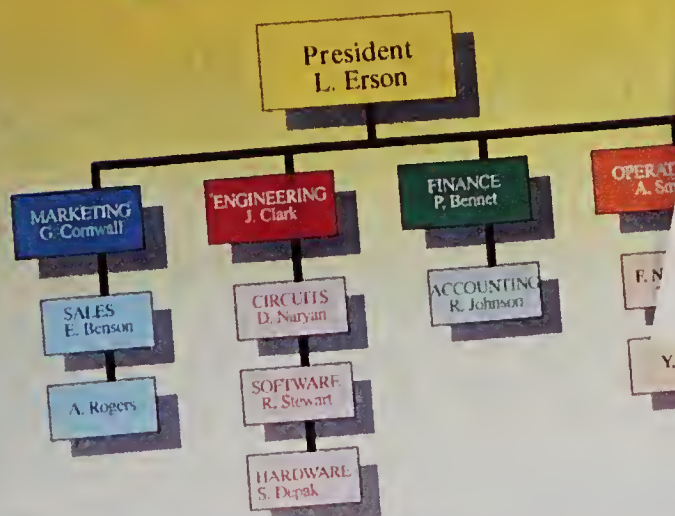
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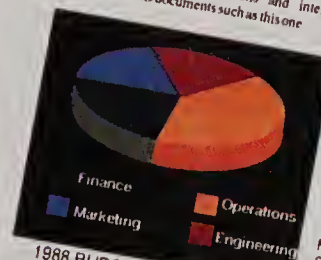
Focus Technologies Inc. Organization Chart - June 1988



FOCAL POINTS NEWS Focus Technologies Employee Newsletter

1988 BUDGETS RELEASED

Recognizing the need for new product development, the 1988 budget reflects a large increase in engineering expenditures. Marketing Resources are also up from last year, in anticipation of the acquisition of a Tektronix color image printer. Marketing will use the new printer to produce more effective customer presentations and internal communications documents such as this one.



1988 BUDGET ALLOCATIONS

GRAPHICS DEPARTMENT FORMED
Focus Technologies employees will welcome the new graphics department which was formed to reduce expenditures on outside services. Art Farah, the department head, promises 24 hour turnaround on most presentation jobs with less than 25 overhead transparencies.

The graphics department has installed an Apple® Macintosh™ II computer with a Tektronix Color

Image Printer. This new system is capable of producing color prints on paper or overhead transparency film. Anticipated uses include generating comprehensive proofs for marketing and advertising material, production of presentation graphics materials for marketing and engineering use and (of course) producing your favorite newsletter which you are now reading.

NEW LENS MATERIAL TECHNOLOGY LAUNCHED

The advanced research labs introduced LENZE, a new metallic compound which transmits light more efficiently than most glass and plastic base materials. LENZE is based on technology derived from superconductor research. It has been measured at over 99.9999% transmission efficiency.

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- Two to ten times faster than any other advanced Macintosh paint or draw program.

Graphist Paint II is a new hi-end paint program with all of the standard painting tools, file formats and 16 Macintosh standard modes . . . PLUS you can:

- Import all of the standard formats, PixelPaint and video inputs (driver built-in) including PAINT, PICT I and II, TIFF and RIFF.
- Export many different formats for direct integration with other software to provide a more complete and better art solution.
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Main original



Incrusting in progress



Incrusting completed

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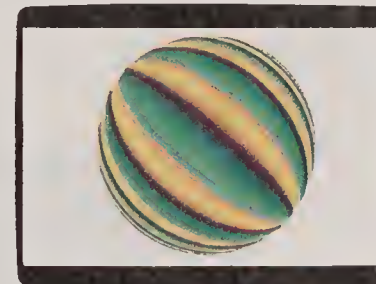
Take any image, or text . . . define the area . . . and create a 3-D sphere of the entire image, or text.



Spherize Type



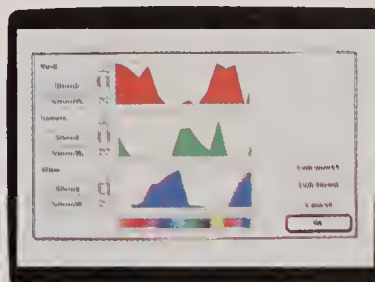
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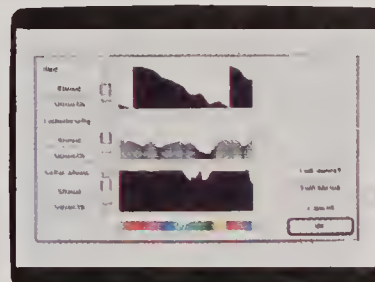
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CUSTOM COLOR MANAGEMENT

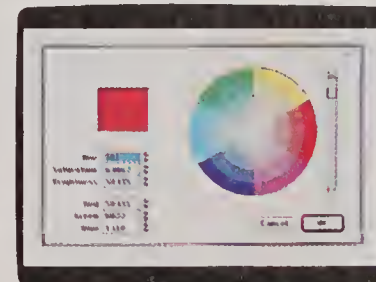
Customize color palettes by changing RGB and/or HLS wave forms — or use the standard Macintosh color picker.



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Hue, Luminosity, Saturation wave form



Macintosh Color Picker

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PixelPaint is a registered trademark of SuperMac Software, a Division of Scientific Micro Systems.



SOFTWARE

Aba Software, Inc.
41 Great Valley Parkway
Malvern, PA 19355

New Products



GDM-1953 Monitor

events. Compatible with 24-bit displays and 8-bit, color and black-and-white Macintosh displays. \$1990; with TV Producer RGB Professional board \$2600. Computer Friends, 503/626-2291.

CommLink 2400 AppleLink-compatible 2400/1200/300 baud external modem. Standard serial interface, works with Hayes-compatible programs. Includes built-in speaker with volume control, auto-dial, auto-answer, and tone detection. \$249. MDIdeas, 415/573-0580.

Feel Factory Interface device that incorporates a Mac-to-MIDI converter and SMPTE reader/generator to give a human feel to synthesizers and drum machines. Accesses complex and variable algorithms, memorizes time modulations and allows you to manipulate MIDI timing information in real time using feel factor algorithms. \$695. Filmsonix, 213/653-0240.

Genlock Converter Video interface for performing special effects by combining Mac II graphics and video. Uses single-slot card. Apple and SuperMac compatible. Compensates for loss of external signal. \$999. Julian Systems, 415/686-4400.

Infinity 40 Turbo Removable 44MB Winchester drive featuring removable hard disk cartridges for unlimited storage capacity; access time averages 25 milliseconds. Includes laser printer and ImageWriter spoolers, DA volume mounter, file locator, and backup utility. \$1795. Peripheral Land, 415/657-2211.

MacADIOS II Jr. Data acquisition board for Mac II. Includes TurboDriver I/O software for oscilloscope and scrolling strip-chart



CommLink 2400

recorder emulations. Features interrupt-driven background tasks, spooling to hard disk, and scan-line recorder emulations. \$890. GW Instruments, 617/625-4096.

MacDSP Floating-point accelerator card for Mac II; includes menu-driven signal processing analysis package. High-speed floating-point capability for acquiring data at up to 125 kHz. Comes with wide range of signal processing functions and flexible viewing modes. Can be configured to work with analog or digital inputs and outputs. 8-MFLOPS with 64K driver software \$2249; 12-MFLOPS version \$1745; 25-MFLOPS

(continues)



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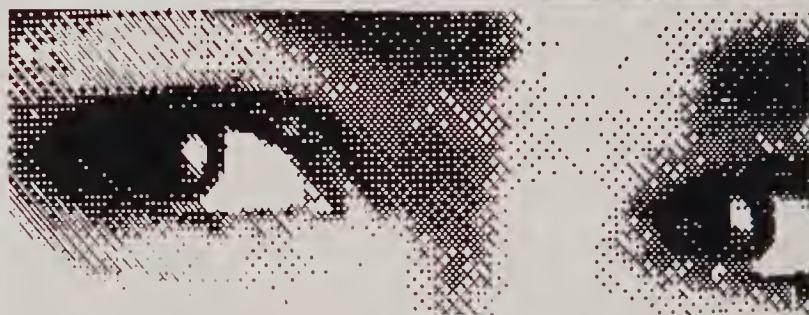


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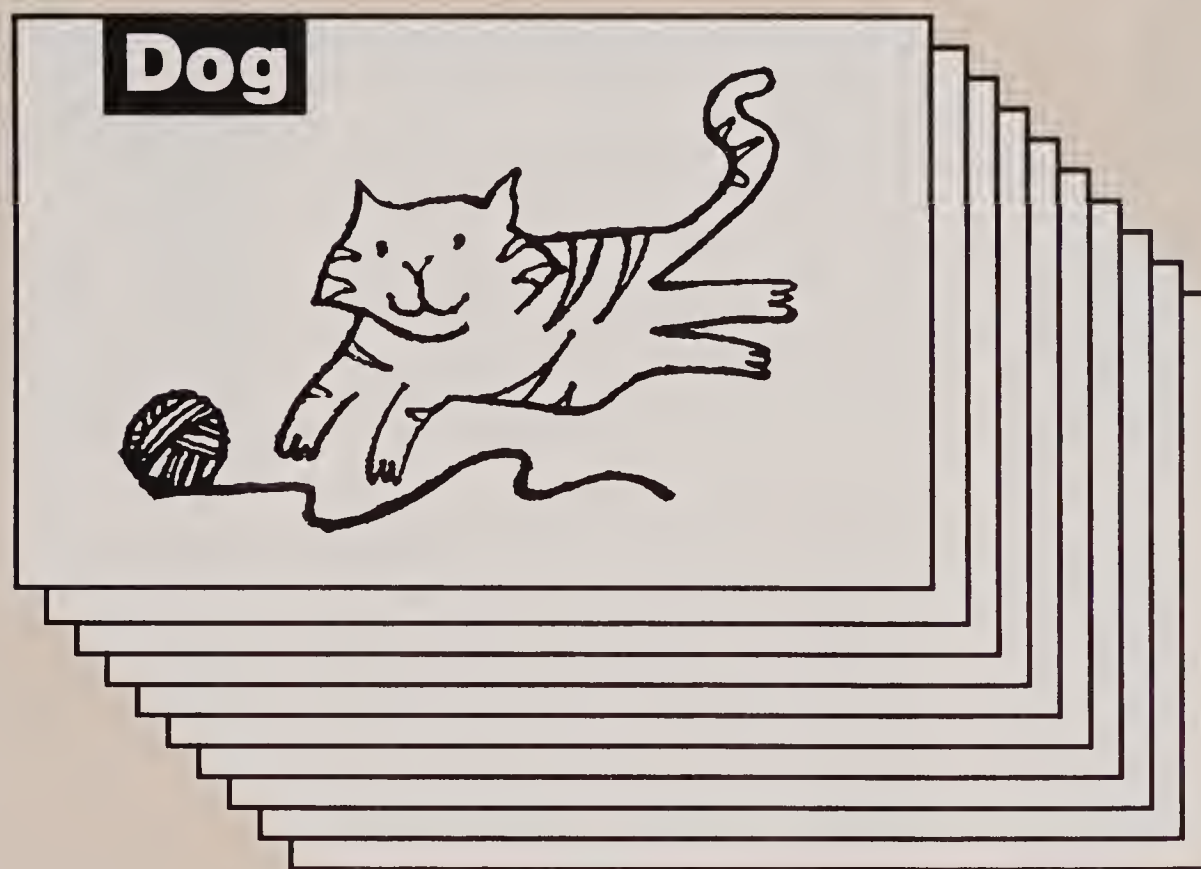
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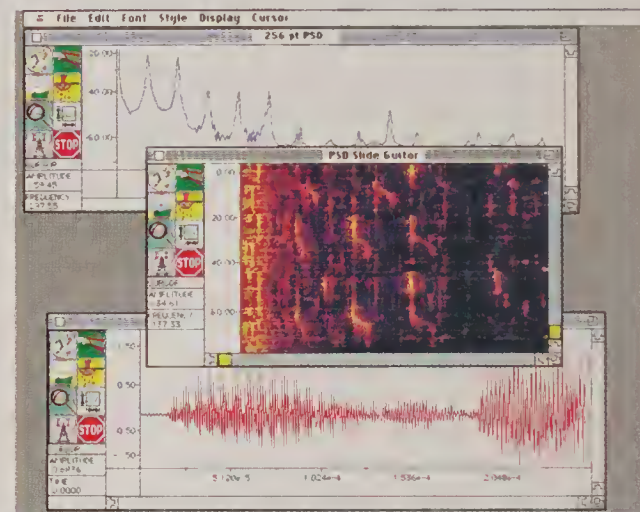
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Micro/SEi Series Internal 3½-inch hard disks, compatible with Mac SE and II. Off-set mounting bracket allows floppy and hard disks to be installed in SE. 30.4MB \$895; 46.7MB \$995; 80.5MB \$1500. MicroNet Technology, 714/837-6033.

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(continues)

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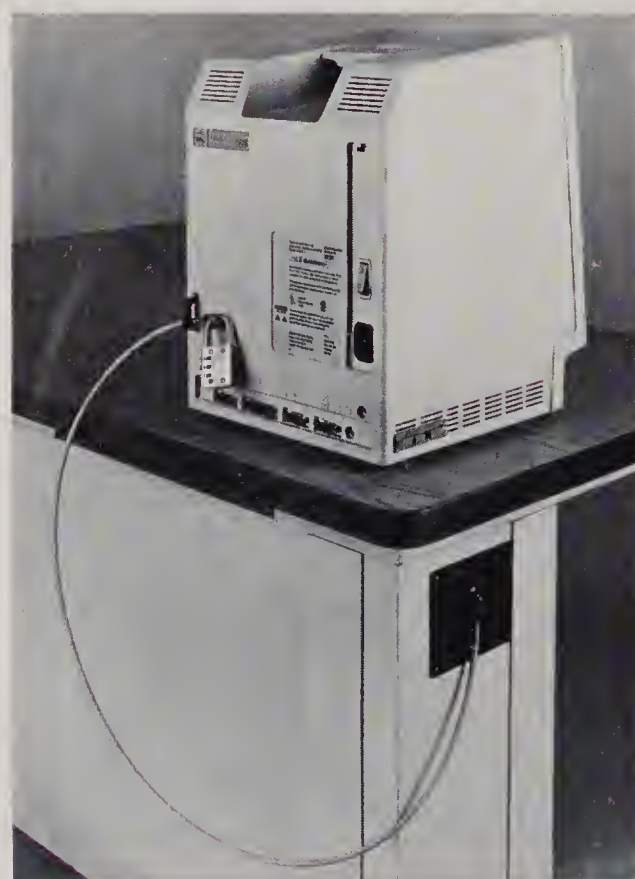
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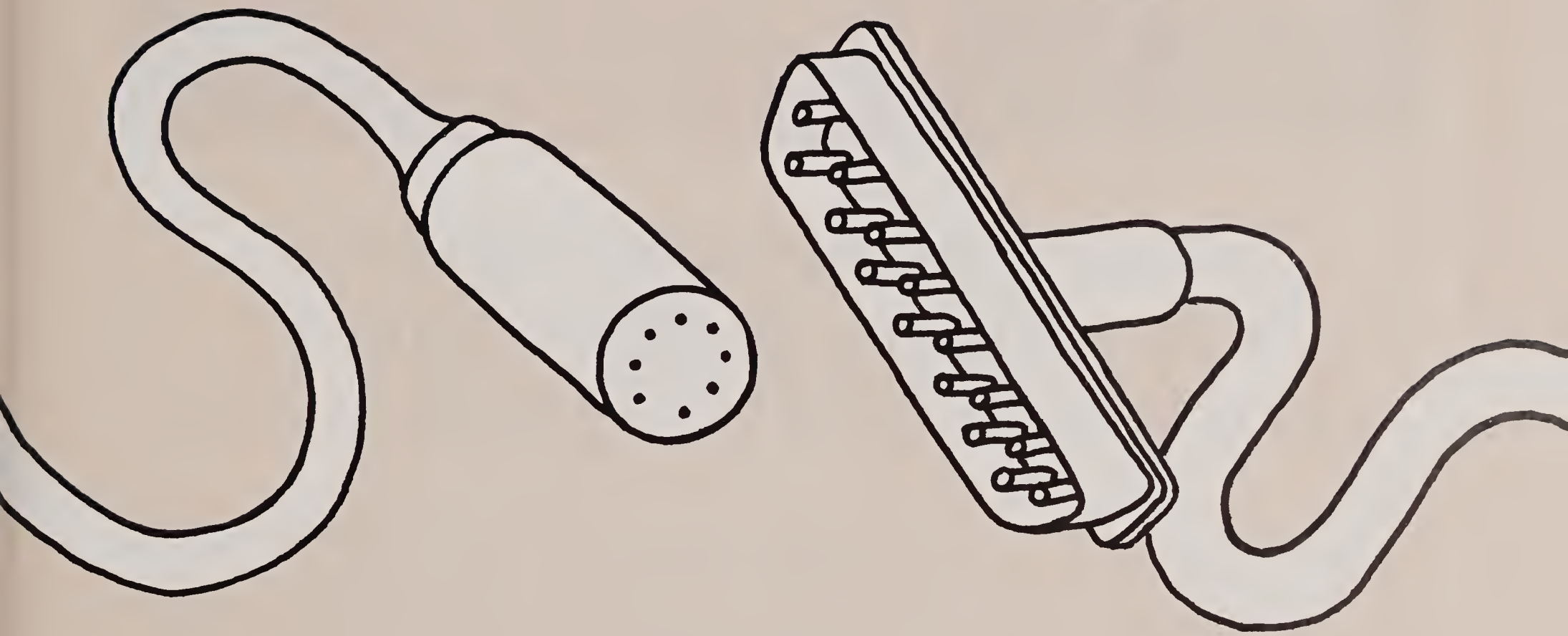
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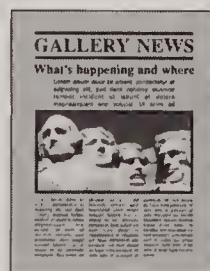
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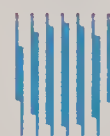
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Quick Tips

Answers to your questions

by Lon Poole

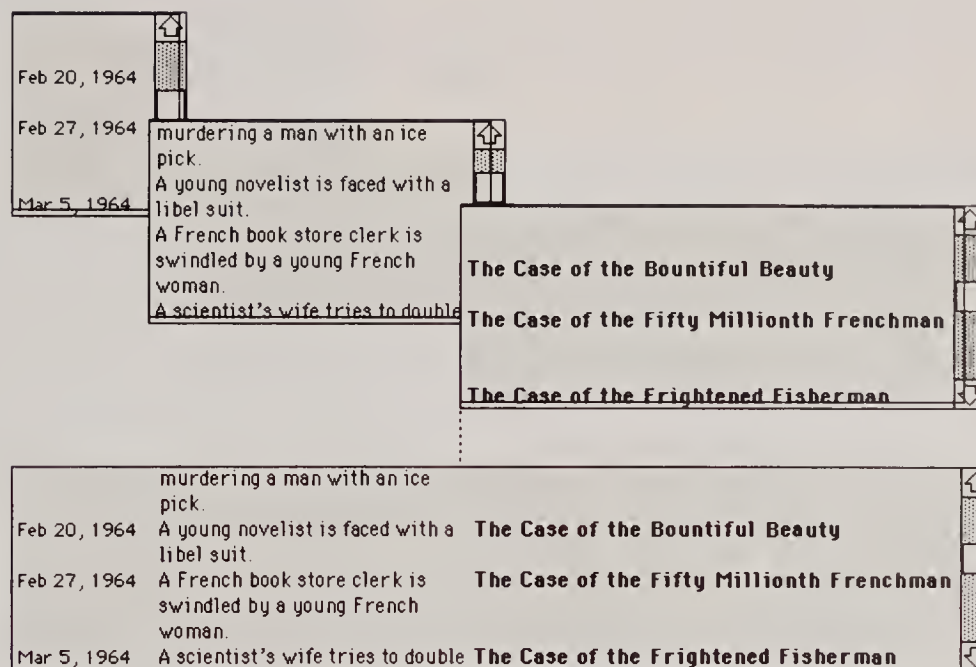
The method described in June's *Quick Tips* for choosing Microsoft Word 3.0x menu commands from the keyboard doesn't work on a keyboard without a numeric keypad. William J. Reynolds of Sioux Falls, South Dakota, reports that you can activate the menu bar by pressing ⌘-Tab no matter what keyboard you have (from the keypad you can also activate the menu bar by pressing the period key [.] or ⌘-period, if Num. Lock is on). To pull down a menu, type the first letter of a menu name or a number from 0 to 8. Then to choose a command, type the first letter of the command and press Return. If the menu has more than one command starting with the same letter, type the letter repeatedly until the appropriate command is highlighted, then press Return.

Linked HyperCard Scrolling

With a special script, you can scroll two or more HyperCard fields simultaneously with one scroll bar. That scroll bar belongs to one of the fields—call it the independent field—and the script sets the Scroll property of the other, dependent fields to the Scroll property of the independent field.

The fields scroll together, but because they are actually separate, each can use a different font and style (though the text must be the same height in all the fields). Scrolling is not synchronous, because the script scrolls the dependent fields only after you finish scrolling the independent field with the scroll bar. As a side effect, you can type no more than one character

Lon Poole answers readers' questions and offers advice in his monthly Macworld column. Many of the tips he's compiled can be found in his book Mac Insights (Microsoft Press, 1987).



SimulScroll

Get the effect of mixed fonts, sizes, and styles in a single HyperCard field by overlaying several fields to look like one. Here, each field covers the scroll bar of its neighbor to the left, while 1-pixel-wide opaque fields mask the field boundary lines. The script in "MultiScroll" enables the scroll bar of one field to scroll all the fields.

```
on idle
  multiScroll "card field 3","card field 2","card field 1"
end idle

--Scroll two or more fields using the scroll bar of one of them.
--Requires at least two parameters:
-- The 1st parameter specifies the independent field.
-- The 2nd and subsequent parameters specify the dependent fields.
on multiScroll
  repeat with n = 2 to the paramCount
    set the textheight of param(n) to the textheight of param(1)
    set the scroll of param(n) to the scroll of param(1)
  end repeat
end multiScroll
```

MultiScroll

These HyperCard handlers let you use one scroll bar to scroll two or more fields.

at the bottom of any of these linked fields, and you cannot select text in them by dragging above or below the field edges.

Arrange the fields so that each one covers the scroll bar of another, with the independent field on top so its scroll bar is uncovered (see "SimulScroll"). To make two adjacent fields look like one, cover the boundary line between them with an opaque field whose width is 1 pixel and whose height is 2 pixels less than the height of the fields.

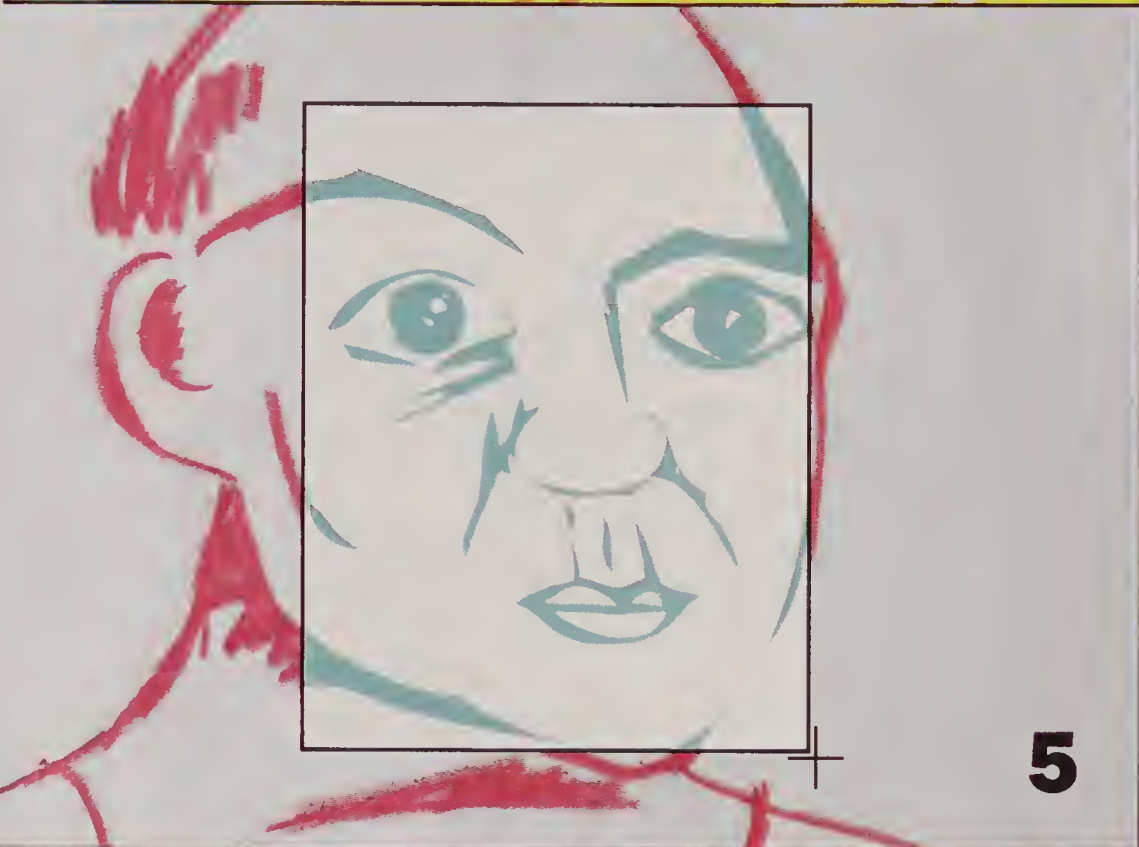
"MultiScroll" lists two handlers: **idle** and **multiScroll**. They go into the card script, the background script, the stack script, or even the Home stack's stack script, depending on how wide you want the script's range to be.

Q Hello LaserWriter? This Is BASIC

After replacing my ImageWriter II with a LaserWriter IISC, I could no longer print the check-writing program I wrote in Microsoft BASIC. I've tried modifying the program to use the OPEN and WINDOW OUTPUT commands, but I can't get it to work. Can you help?

*Louis Umphenor
Costa Mesa, California*

(continues)



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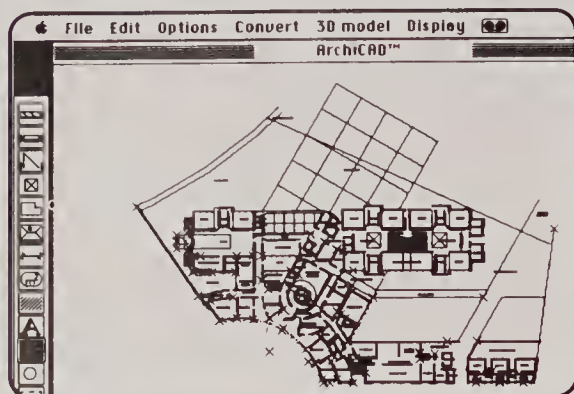
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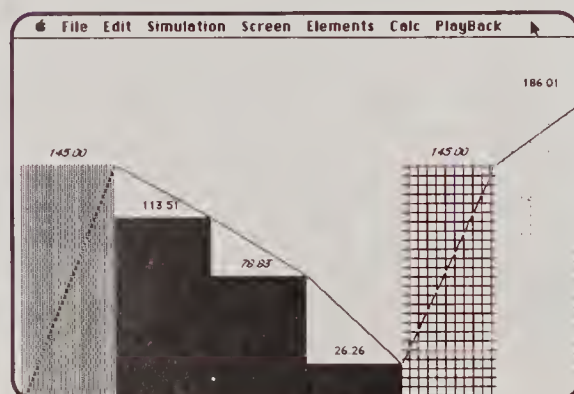
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How To/Quick Tips

BASIC LaserWriter

By using the method illustrated in this sample program, you can enable Microsoft BASIC version 3.0 to print to a LaserWriter.

'This BASIC program shows how to print any font, size, and style text and how to draw graphics on a printer.

'Fonts and styles are known by number in BASIC.
'Assign some numbers to mnemonic variables.

```
Chicago=0
Geneva=1
NewYork=2
Athens=7
LosAngeles=12
AvantGarde=33
Bookman=14
Courier=22
Garamond=156
Helvetica=21
NewCenturySchlbk=34
NHelveticaNarrow=15
Palatino=16
Symbol=23
Times=20
ZapfChancery=133
ZapfDingbats=13
Plain=0
Bold=1
Italic=2
Extended=64
```

'Open the printer as output device #1. Present the standard dialog boxes for Page Setup and Print.

OPEN "LPT1:PROMPT" FOR OUTPUT AS #1

'Redirect output to device #1, the printer.

WINDOW OUTPUT #1

'Set the maximum line width for no word wrap.

WIDTH #1, 255

'Set text attributes for the title.

CALL TEXTFONT(NewYork)

CALL TEXTSIZE(14)

CALL TEXTFACE(Bold+Extended)

'Print the title.

PRINT #1, ""

PRINT #1, ""

PRINT #1, TAB(18); "The Balloon of the Mind"

PRINT #1, ""

'Change text attributes for regular text.

CALL TEXTFONT(Bookman)

CALL TEXTSIZE(12)

CALL TEXTFACE(Italic)

'Print some regular text.

PRINT #1, TAB(25); "Hands, do what you're bid:"

PRINT #1, TAB(25); "Bring the balloon of the mind"

PRINT #1, TAB(25); "That bellies and drags in the wind"

PRINT #1, TAB(25); "Into its narrow shed."

PRINT #1, ""

CALL TEXTSIZE(10)

CALL TEXTFACE(Plain)

PRINT #1, TAB(60); "W.B. Yeats"

'Draw the biggest rectangle that fits on

'a printed 8 1/2-by-11-inch page.

LINE (180,12) - (432,216),,B

'Nothing prints until the device is closed.

CLOSE #1

As you've discovered, BASIC's LPRINT and LCOPY statements don't work with LaserWriters. But BASIC version 3.0 can print to a LaserWriter if you open the printer as an output device using a statement such as **OPEN "LPT1:" FOR OUTPUT AS #1** (see "BASIC LaserWriter"). Then you must use the same device number in **PRINT** and in other output statements that you want to go to the printer. (Device "LPT1:" is the printer currently selected in the Chooser. You can also use

the device "LPT1:PROMPT" to select that printer and display the standard Page Setup and Print dialog boxes.)

If you want to be able to print graphics and any text font, size, or style, include a statement such as **WINDOW OUTPUT #1** after the **OPEN** statement. Next use a **WIDTH #** statement to set the line width at the printer. After the preliminaries, use **PRINT #** and **PRINT # USING** statements

(continues)

FROM THE DUBL-CLICK COLLECTION



MacUser gave WetPaint 5 mice (Sept. 1987) saying "...the WetPaint art is almost a must for clip art users; the ArtRoundup desk accessory is a necessity." Volumes marked with * were previously released as "MacMemories."

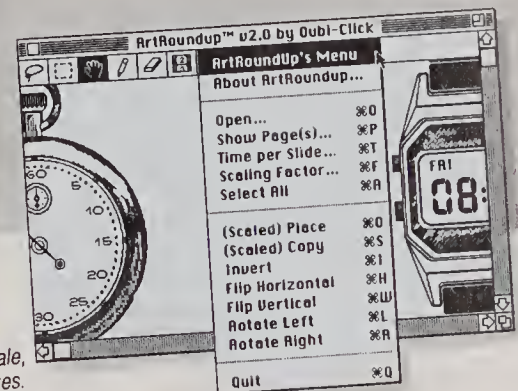
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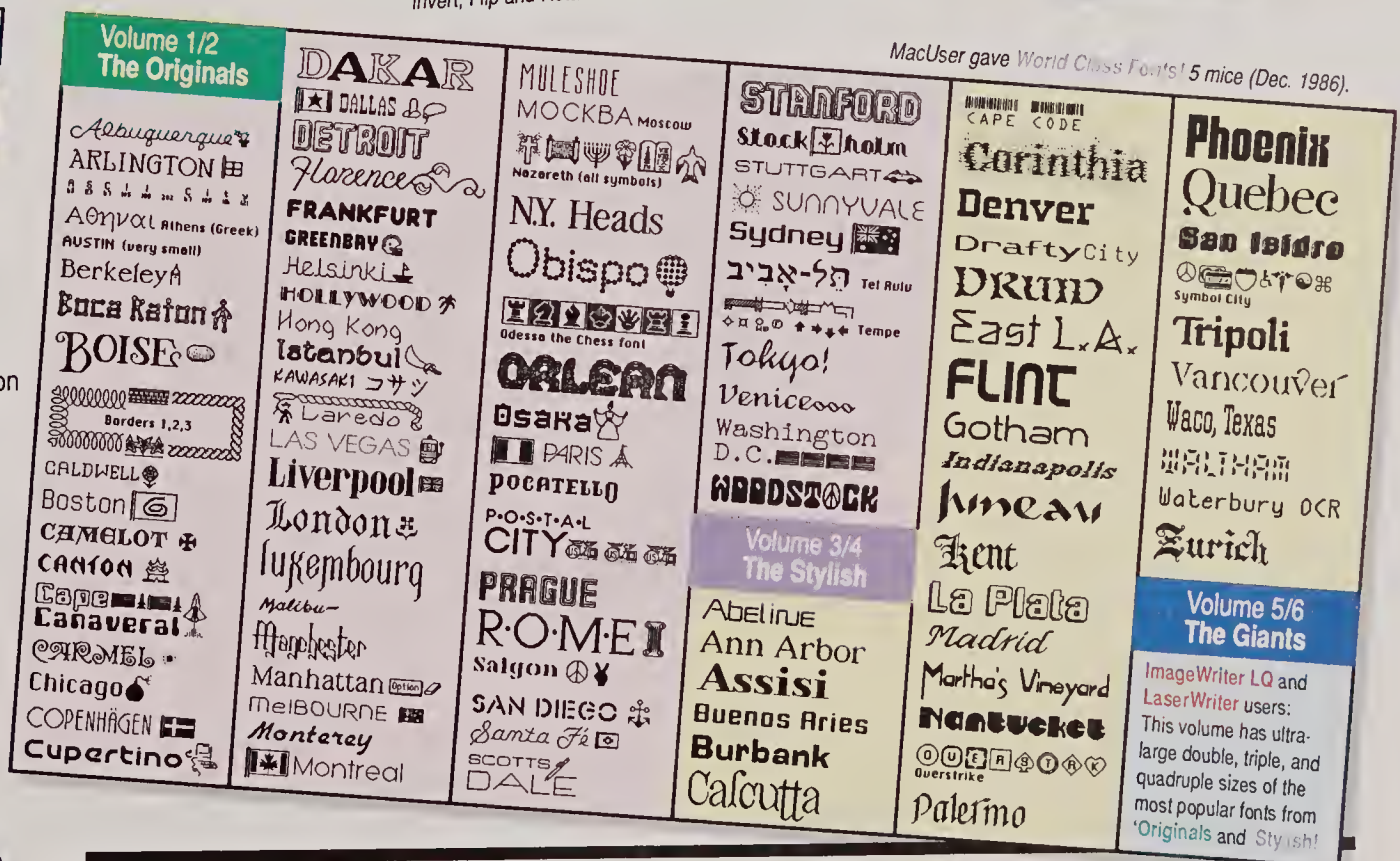
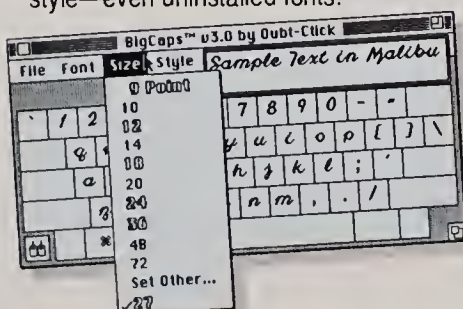
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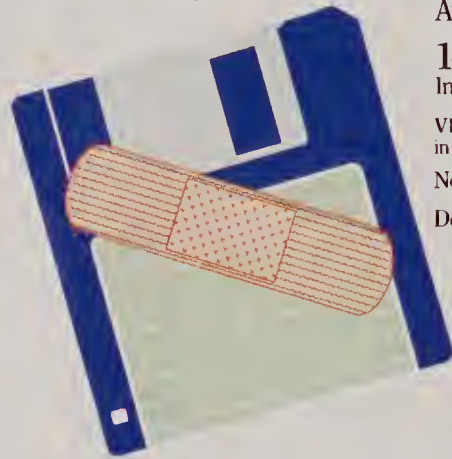
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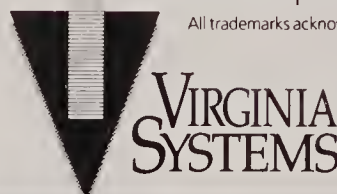
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How To/Quick Tips

to print text, and use any of BASIC's graphics-drawing statements to print graphics. To change the text font, size, or style, use CALL TEXTFONT, CALL TEXTSIZE, or CALL TEXTFACE statements.

As your program sends output to the printer, BASIC spools it to a disk file. The printer starts printing when your program ends or when it closes the printer with a CLOSE # statement.

Icons on the Desktop

Is a file deleted when you drag its icon onto the desktop?

*Kuan-Ming Huang
Bellevue, Washington*

Icons on the desktop are much like icons in the disk window. You can use all the same commands from the Finder's menus (except the View menu) on them. Files on the desktop appear (along with files from the disk window) in a directory dialog box, which you see in most applications after you've chosen Open or Save As from the File menu. You can have icons on the desktop from more than one disk. The Finder remembers the disk and folder that most recently contained each icon.

But under MultiFinder, desktop icons do not automatically come to the front when you activate the Finder. They stay buried beneath the windows of open applications. And except when copying one 800K disk to another, the Finder won't copy icons from the desktop when you drag a disk or folder to another disk.

The only way to delete a file using the Finder is to drag its icon to the Trash.

'Rithmetic

I've been unable to find an application to create math worksheets for elementary-school teaching. My toughest requirements are a long-division sign and vertical (stacked) fractions.

Each worksheet should have 20 to 30 problems, so I need something that is not time-consuming. Applications like Mac EQN, Math Power, and the Expressionist either lack the proper symbols and formats or are too slow.

*Stan Collins
Eugene, Oregon*

(continues)

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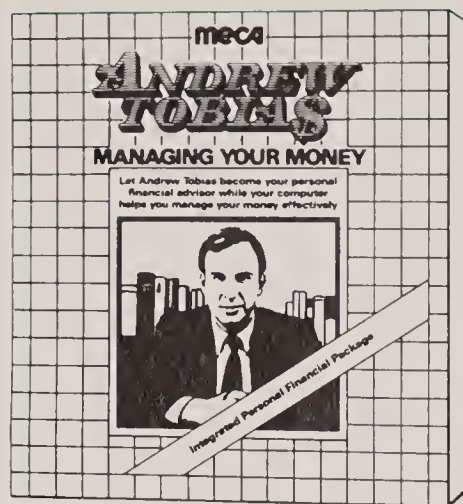
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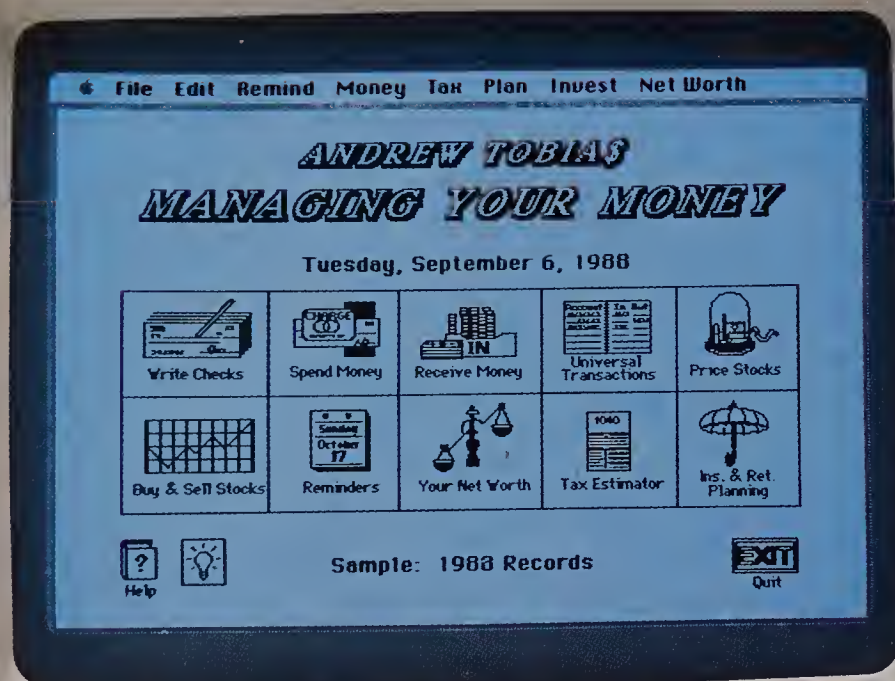
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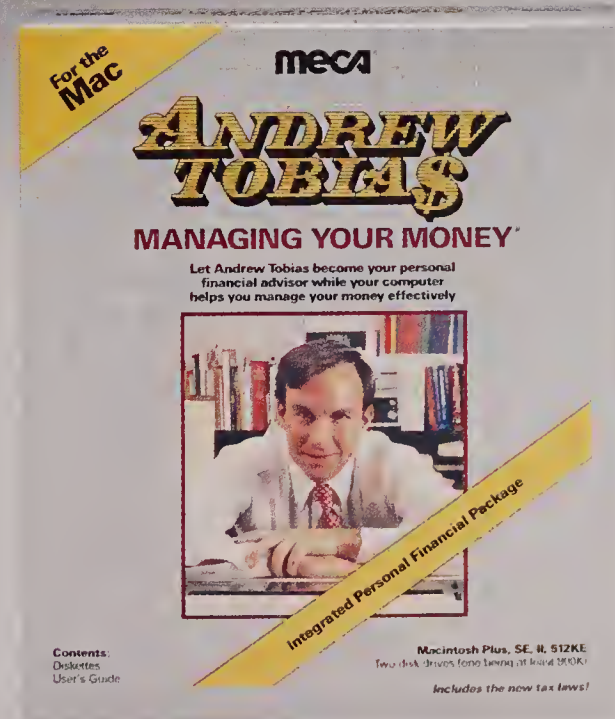
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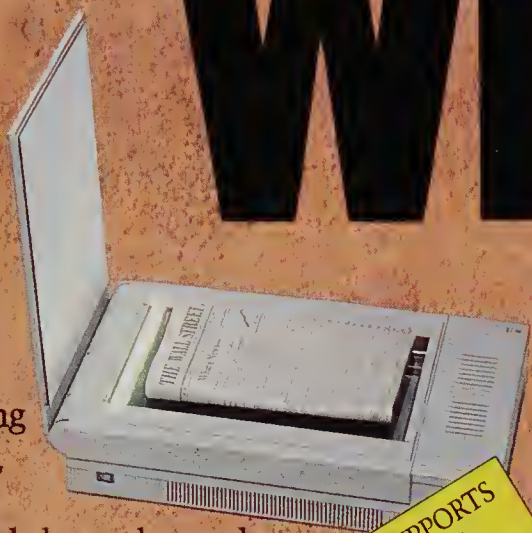
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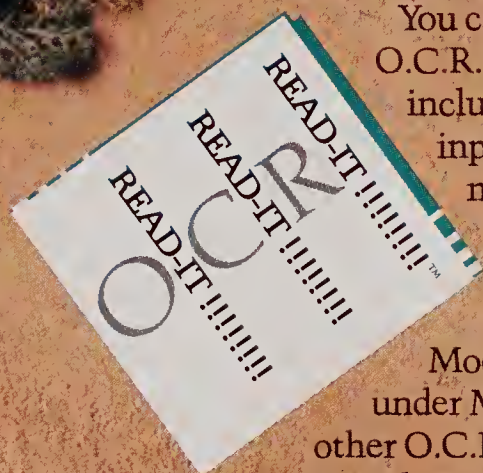
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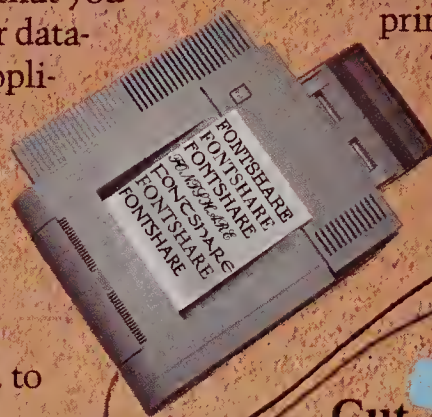


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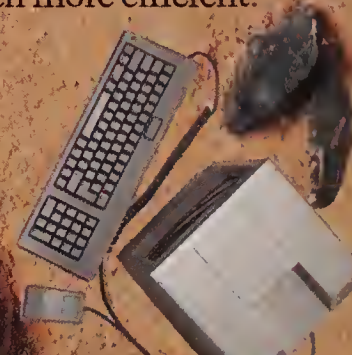
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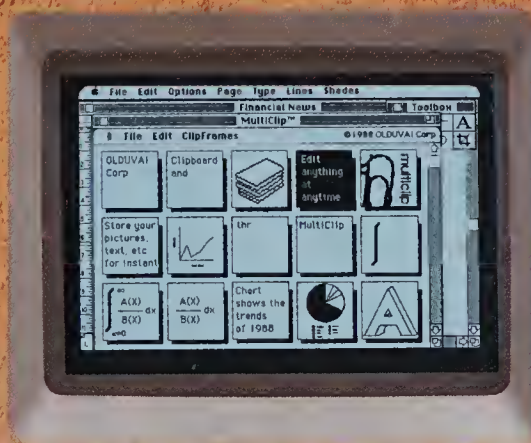
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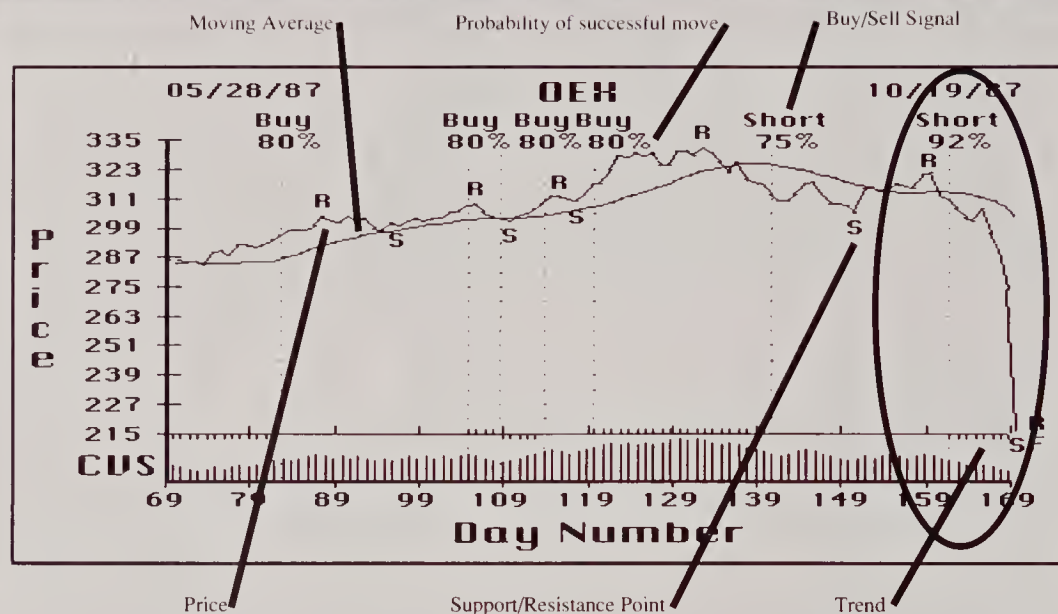
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How To/Quick Tips

A What about a drawing application such as MacDraw II or SuperPaint? I created a sample long-division problem and a sample stacked-fraction problem in about 10 minutes in each application. Then I used the samples as templates and created a page of 26 problems in 20 minutes (see "Homework Assignment"). For this type of

Arithmetic Worksheet Number 1 Name _____

1. $3 \overline{) 6}$	9. $6 \overline{) 42}$	$2 \frac{1}{2}$	$\frac{5}{16}$
		$+ 3 \frac{1}{12}$	$+ 3 \frac{3}{4}$
2. $4 \overline{) 8}$	10. $7 \overline{) 28}$	$4 \frac{3}{4}$	$13 \frac{1}{2}$
		$+ 6 \frac{3}{8}$	$+ 7 \frac{1}{4}$
3. $6 \overline{) 12}$	11. $8 \overline{) 32}$	$10 \frac{2}{3}$	$2 \frac{9}{32}$
		$+ 11 \frac{1}{4}$	$+ \frac{5}{16}$
4. $3 \overline{) 9}$	12. $5 \overline{) 35}$	$8 \frac{5}{6}$	$12 \frac{5}{8}$
		$+ 3 \frac{2}{5}$	$+ 5 \frac{7}{16}$
5. $5 \overline{) 5}$	13. $6 \overline{) 30}$	$5 \frac{3}{8}$	$1 \frac{3}{16}$
		$+ 9 \frac{1}{2}$	$+ 15 \frac{1}{4}$
6. $1 \overline{) 7}$	14. $4 \overline{) 20}$		
7. $5 \overline{) 15}$	15. $3 \overline{) 12}$		
8. $4 \overline{) 12}$	16. $6 \overline{) 18}$		

Homework Assignment

You can quickly create a page of arithmetic problems using a drawing program. First create models of each type of problem, next duplicate the models, then go back and change the numbers in the duplicate.

work, drawing applications have a real advantage over painting programs like MacPaint because the numbers you put in a template are easy to change in a duplicate of the template. You can create a long-division sign using the oval, rectangle, and line tools (see "Long Division"). To resize the entire division sign, select all of its parts, group them, and drag one of the corners of the composite object. When typing the divisor to the left of the long-division sign, use right-aligned text. Use left-aligned text for the dividend under the division sign.

To create the fraction template, use left-aligned text for the whole numbers. Use center-aligned text for the numerator and denominator of the fractions and put them in a smaller font size than the whole

(continues)

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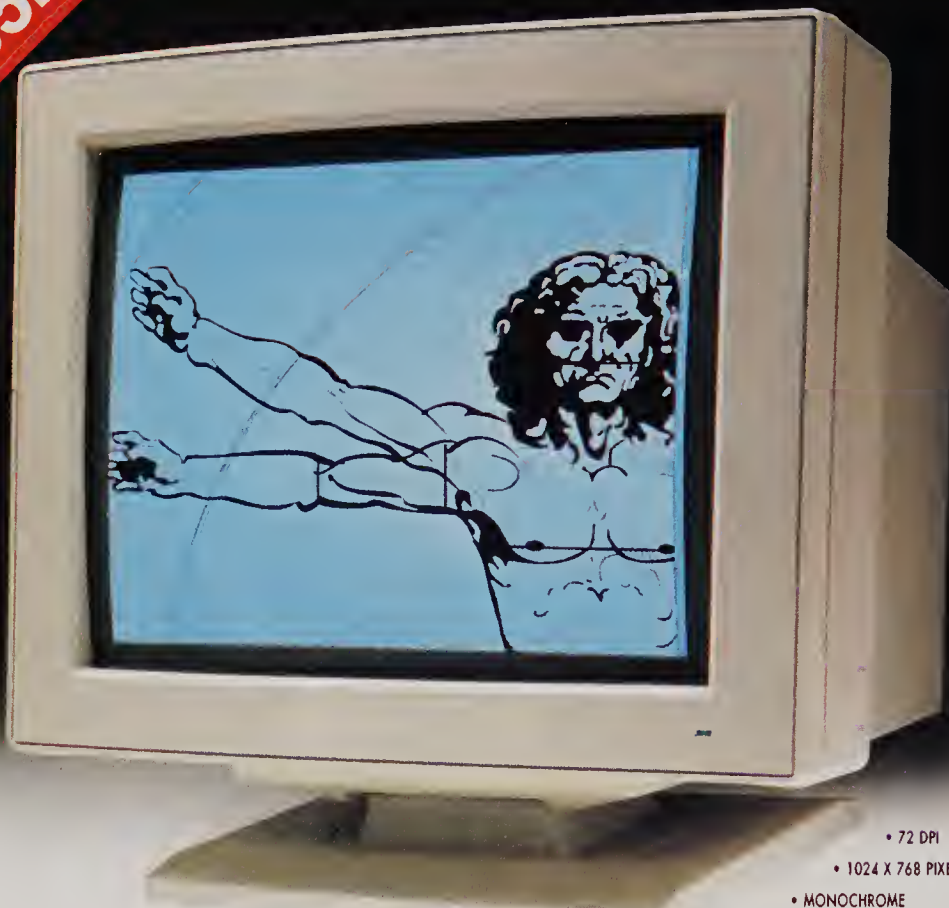
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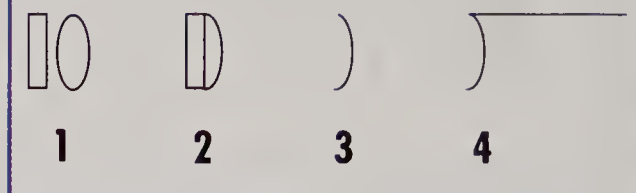
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Long Division

For a long-division sign, first draw a tall oval and a thin, white, borderless rectangle the same height. Drag the rectangle over the left half of the oval, leaving an arc visible. Select both components of the arc—the oval and the rectangle—and group them. Then draw a horizontal line and position it so its left end just touches the top of the arc.

numbers. You can align the numbers by eye or with MacDraw's Alignment menu command or SuperPaint's Align Objects menu command.

Instead of using a drawing application, you can use the equation-editor desk accessory Math Type (from Design Science, 213/433-0685). See *Macworld*, April 1988, for a review.

Get Closer in PageMaker

Tip: PageMaker 3.0 has an undocumented page view of 400 percent. To use it, press the Shift key while choosing 200% from the Page menu. Although Option-⌘-Shift-click will access the 200 percent view, I've found no similar keyboard shortcut for 400 percent.

Paul Wolfram and Rob Sandberg
Las Vegas, Nevada

Multicolumn Laser Labels

Tip: I have discovered a way to print multicolumn mailing labels on a LaserWriter using the Print Merge command in Microsoft Word 3.0x. The Word manual's directions for printing three-column labels work only with continuous forms, which you can't use with a LaserWriter.

The main print-merge document, which specifies the format of the printed labels, contains a separate template for the first label in each column. In each template you put the name of each field where you want the field value to appear when printed (see "Print-Merge Laser Labels"). You can use <<if>> instructions to skip empty fields. More <<if>> instructions at the end of the first template compensate for skipped fields by inserting blank lines. (Only the first template needs to compen-

(continues)



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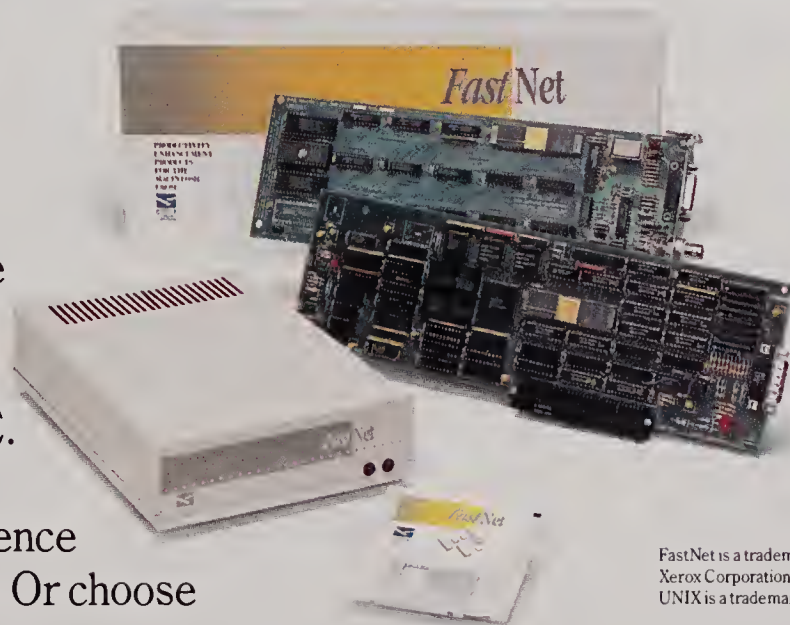
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```
<<data dataFileName
<<if salut>><<salut>>
  <<endif>><<fname>> <<if mi>><<mi>>
  <<endif>><<lname>>
<<if title>><<title>>
<<endif>>
<<if comp>><<comp>>
<<endif>>
<<if add1>><<add1>>
<<endif>>
<<if add2>><<add2>>
<<endif>>
<<if add3>><<add3>>
<<endif>>
<<city>>, <<state>> <<zip>>
<<if title>><<else>>
<<endif>>
<<if comp>><<else>>
<<endif>>
<<if add1>><<else>>
<<endif>>
<<if add2>><<else>>
<<endif>>
<<if add3>><<else>>
<<endif>>
<<next>>

<<if salut>><<salut>> <<endif>><<fname>>
  <<if mi>><<mi>> <<endif>><<lname>>
  <<endif>><<fname>> <<if mi>>
  <<endif>><<lname>>
  <<if title>><<title>>
  <<endif>>
  <<if comp>><<comp>>
  <<endif>>
  <<if add1>><<add1>>
  <<endif>>
  <<if add2>><<add2>>
  <<endif>>
  <<if add3>><<add3>>
  <<endif>>
  <<city>>, <<state>> <<zip>>
  <<endif>>
  <<next>>
```

Print-Merge Laser Labels

This Microsoft Word document specifies where information goes when you print three-column labels (24 labels per sheet) on a LaserWriter using the Print Merge menu command. The columns appear side by side when printed but not when viewed on screen. The entire document is formatted for side-by-side columns and no break between sections. The Larger Print Area option is on, the paper height is 11.4 inches, and the bottom margin is 0.1 inches.

sate, because it determines the height for all labels.) All but the template for the last column must end with a <<next>> instruction so that Word will read a new data record for the next template. Word automatically reads a new record after the last template.

After creating the templates, adjust their margins to position them in columns. (Adjusting margins won't put them side by side on screen.) Make sure that each template's left margins are farther right than the right margins of its neighbor to the left.

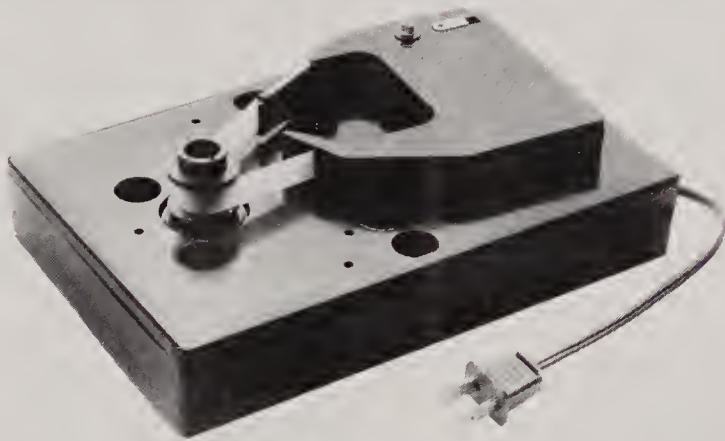
Next, select all the templates, choose Paragraph from the Format menu, and select the Side-by-Side option. Use the Page Preview menu command to check your work so far. If it doesn't show the labels side by side, recheck the templates' margins and the Side-by-Side setting. To get more than one row of labels per page, you must choose Section from the Format menu and select No Break for the Section Start option.

Before printing, press Shift and choose Page Setup. Click the Option button and select the Larger Print Area option.

(continues)

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And we were delighted with her comment, since that's exactly what we aim for when we design accessories for the Mac — to build in the most benefits at the best price possible.

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In fact, we've figured out so many ways to enhance and protect your Macintosh, we can't fit them all on one page.

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Then choose Page Setup again, but without pressing Shift, and set the paper height to 11.4 inches and the bottom margin to 0.1 inches. These settings enable you to print a row of labels at the very bottom of the page.

When you use the Print Merge command, you must click the New Document option to create a new document of merged labels. You then use the Print command to print the new document on label stock.

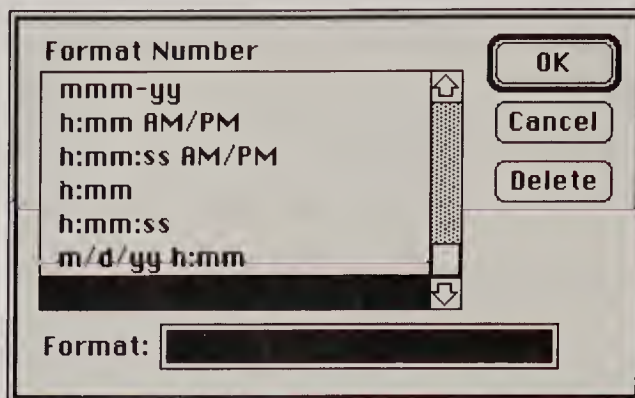
You can adjust the gap between rows of labels by changing the After specification of the paragraph format of the first label's last line.

*Paul M. Suchko
Pittsburgh, Pennsylvania*

For more information on merge printing, look under "Form Letters" in the Word manual.

Hidden Numbers

Tip: Would you like to hide numeric values on a Microsoft Excel worksheet without affecting the cell values or formu-



Cell Blank

Use a blank number format to hide cell values in a Microsoft Excel worksheet.

las? Don't bother with the Cell Protection and Protect Document menu commands; they hide formulas, but not values. Simply select the cells you want to hide, choose Number from the Format menu, press Backspace or Delete, type a space, and press Return. You have given the selected cells a blank number format. The blank format appears as a choice in the Format Number dialog box (see "Cell Blank"), where you can use it on other cells that have numeric values.

*Dan Smith
Merrill, Iowa*

Secret Symbols

Tip: My mathematician's sense of symmetry was violated by the discovery that the Symbol font contains no characters for subset (\subset) and proper subset (\subseteq), even though Key Caps indicates that the converse symbols of subset (\supset) and proper subset (\supseteq) are available. To type the subset symbol, press Option-N followed by Shift-A in the Symbol font. Similarly, to type the proper subset symbol, press Option-N, Shift-O. You can also produce \neq by pressing Option-`, Shift-A.

*Stan Wagon
Leverett, Massachusetts*

We pay from \$25 to \$100 for tips published here. Send tips or questions (include your address and phone number) to Quick Tips, Macworld, 501 Second St., San Francisco, CA 94107. Send electronic mail to CompuServe (70370,702) or MCI Mail (addressed to Macworld). All published submissions become the property of Macworld. □

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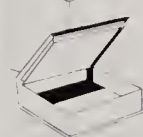
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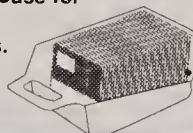
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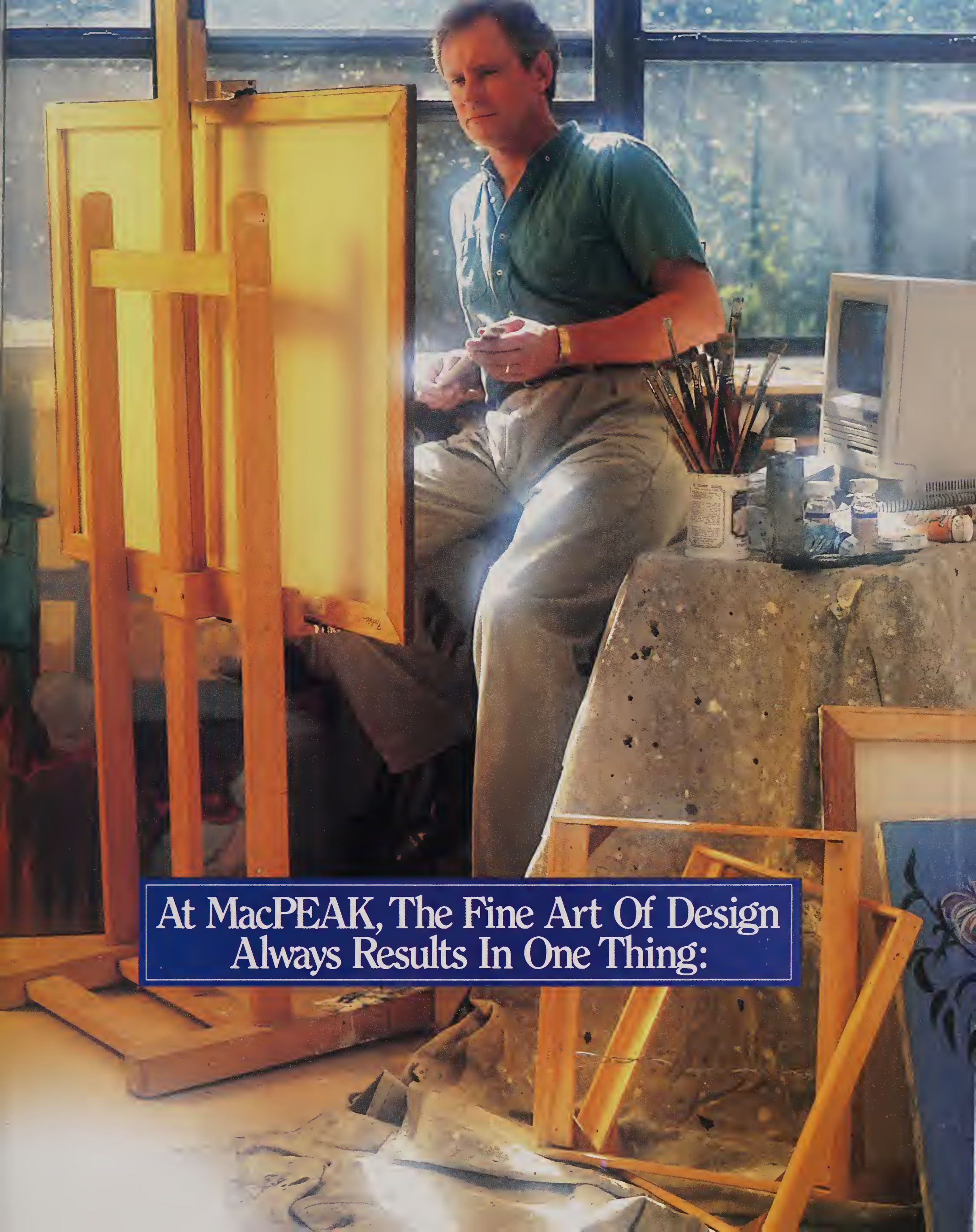
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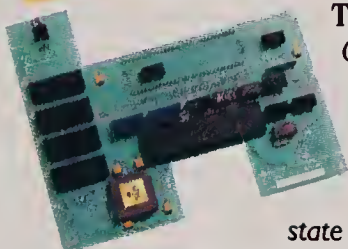
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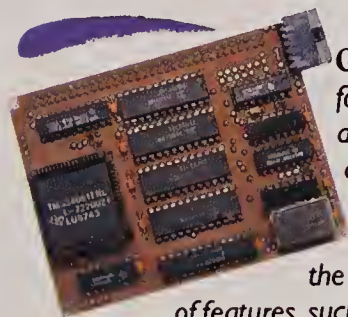
The Orion One Accelerator. The Orion One is an entry-level accelerator card for the Macintosh Plus or Macintosh SE. The Orion One replaces the native 8 MHz 68000 with a faster 16 MHz 68000 and 16k of zero-wait-state static RAM. The result: up to 2.5 times better performance. The Orion One also supports an optional 68881 Floating Point Math Co-processor. Using the optional 68881, math-intensive applications can see performance increases in excess of 30 times.



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The Orion II is a state-of-the-art accelerator for the Macintosh II.

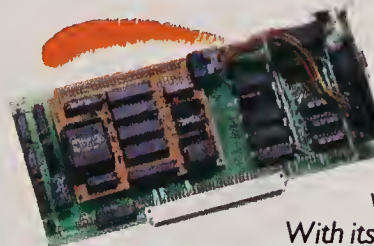
Using NuBus, it replaces the Mac II's 16 MHz 68020 with a 25 MHz 68030, supported by 256k of zero-wait-state static RAM. Users can optionally add up to a megabyte of static RAM, and the new 68882 Floating Point Math Co-processor. The static RAM serves as a general function cache, greatly enhancing the performance of all applications, including A/UX. The advanced cache technology also works with other NuBus cards, like 24-bit video cards, thereby substantially increasing their performance as well. The Orion II is able to boost a Mac II's performance by 2–4 times. With supporting applications, the 68882 is able to do floating point calculations up to twice as fast as the 68881.



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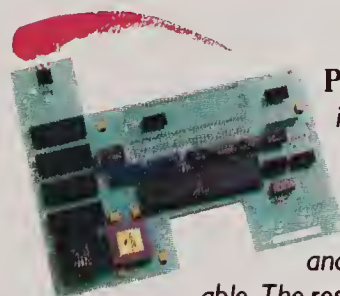
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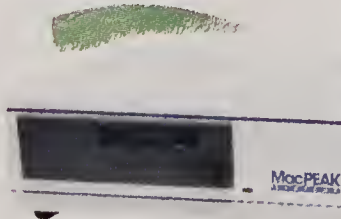


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Totals					242 86		242 86
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	03/08	0 780115		2362 88			
Totals			3595 47	2362 88			5958 35
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Totals			278 88		300 52		579 40

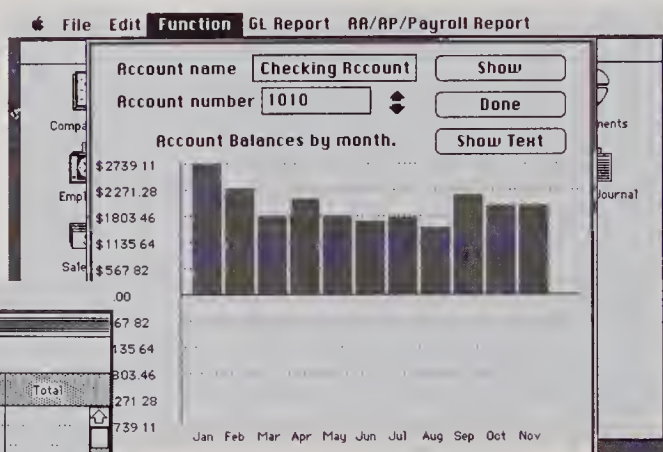
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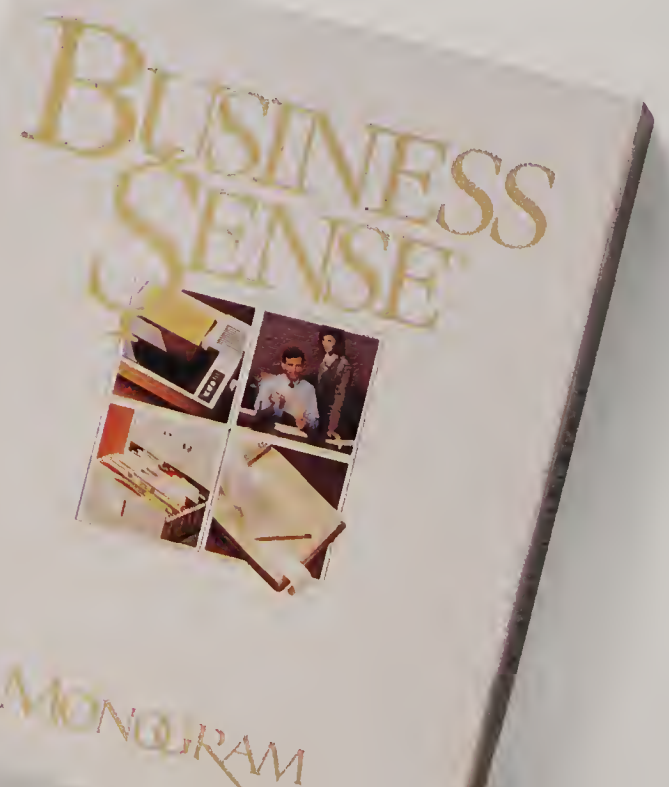
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*Business Software Magazine Accounting Survey, July, 1987

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Getting Started with Scanners

From dithers to gray scales to OCR, an introduction to turning pictures into pixels

by Jim Heid

Owning a scanner probably sounds enticing. Think of the possibilities—if your database manager supports graphics, you can put scanned images of products in your inventory database. A real-estate database could include an image of each property along with its description, allowing prospective buyers to search for—and see—houses meeting their needs.

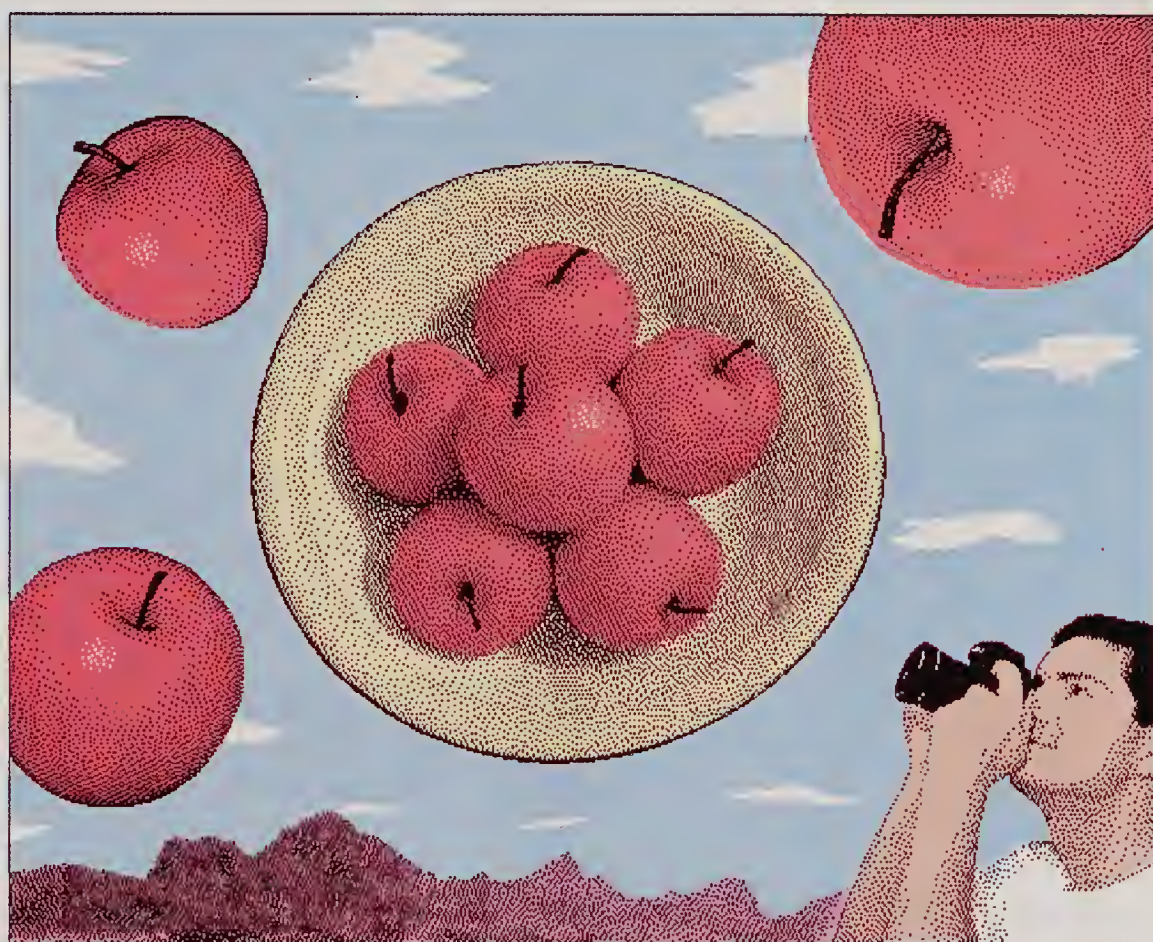
Scanned images team up well with HyperCard, too. You might scan a map, then adorn it with buttons and scripts that describe a street or landmark when you click on it. Or you could scan a diagram of an engine, then create scripts describing each part's purpose.

But before you head for the store, consider the drawbacks. Most scanners are expensive, as well as being gluttons for storage and memory. This month I'll explore the world of electronic imaging to help you decide if a scanner belongs on your shopping list (for a list of vendors, see "Scanning the Field").

A Scanner's Roles

By optically reading photographs or other artwork to create electronic images that you can alter, a scanner typically provides graphics files for use in desktop publications. But since most Mac programs can accept graphics from the Clipboard or directly from MacPaint documents, you can use scanned images just about anywhere.

Jim Heid is a Macworld contributing editor who focuses each month on a different aspect of Mac fundamentals.



Scanners can also be used with *optical character recognition (OCR)* software—which turns a scanner into an electronic typist that can scan pages of text and turn out text files you can edit with a word processor. (Without OCR software, scanning text is like photographing it—you can't edit or reformat the end product.)

When it comes to scanning images, originals come in two flavors: *continuous-tone* images (such as photographs), which contain white and black areas along with many shades of gray; and *line art* (such as diagrams or pen-and-ink drawings), which is strictly black and white.

Scanner Species

Most scanners work like photocopiers—illuminating the original while a sensor called a *charge-coupled device*, or *CCD*, measures the light it reflects and generates a voltage. The scanner's software translates the voltage values into data that represent the image (see "Anatomy of a Scan").

There are two main types of scanners. With a *flatbed* scanner, the original image remains stationary and the CCD mechanism moves across it during the scan. With

(continues)



Novell presents a new even the pickiest

Macintosh owners have a reputation for being fanatical about their Macs. And rightfully so, when you consider the elegance of the Macintosh user interface.

So when Novell set out to network the Macintosh with PCs, it was with one clear caveat: preserve the Mac environment. Create network software that would feel right to the pickiest of all Macintosh users. And none are pickier than the ones at Apple.

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Freedom to choose. NetWare for Macintosh lets you connect Macs with a

product introduction, Apple
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InfoWorld, June 20, 1988

work made to satisfy Macintosh user.

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Thunderware, Inc.

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Truvel Corp.

8943 Fullbright Ave.
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818/407-1031

a *sheet-fed* or *edge-feed* scanner, you feed the original into a slot, and a set of rubber rollers draws it past a stationary CCD mechanism.

Each approach has advantages and drawbacks. Flatbed scanners can scan pages from books and other originals too thick to fit between a sheet-fed scanner's rollers. Flatbed units also eliminate the risk of a delicate or irregularly shaped original's jamming inside the unit. And they provide guides that make it easy to position the original. With a sheet-fed scanner, it's easy to insert something crookedly,

causing crooked or *skewed* scans. Skewing is especially apparent with line art because it causes straight lines to assume a jagged-edged, stair-stepped look. With photos, skewing simply makes your photographer look sloppy.

But sheet-fed scanners usually cost less, since they don't need a system of precisely aligned guides and rails to move the scanning mechanism. And their transport mechanisms lend themselves nicely to accepting *automatic document feeders*, paper-handling add-ons that shuttle originals into and out of the scanner for you—a real time-saver for OCR work. Automatic document feeders are available for some flatbed

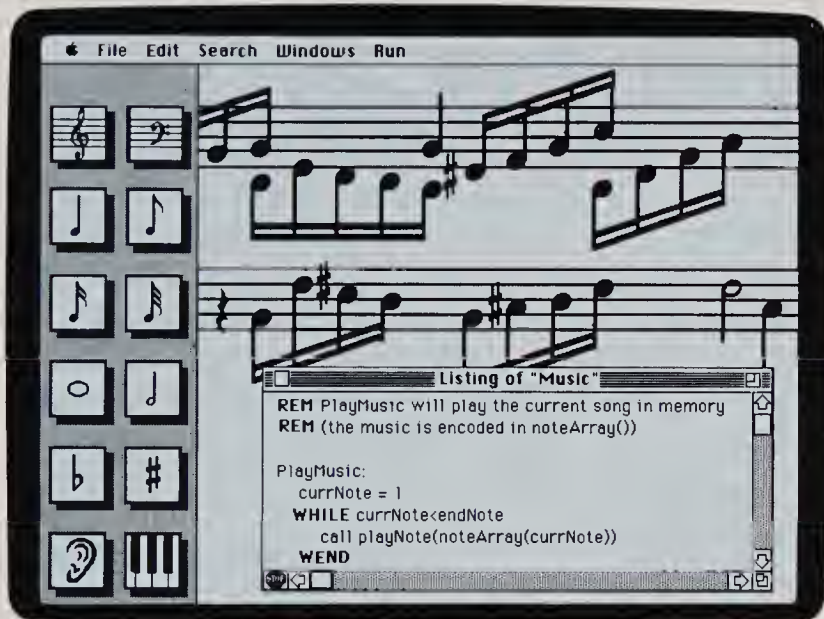
scanners, but they're more common and often less costly in the sheet-fed world.

Both types of scanners usually attach to either the Mac's SCSI port or its modem port. SCSI-equipped scanners are preferable: besides not monopolizing your modem port, they transfer data faster—a big plus, since scanned images can comprise many megabytes of data.

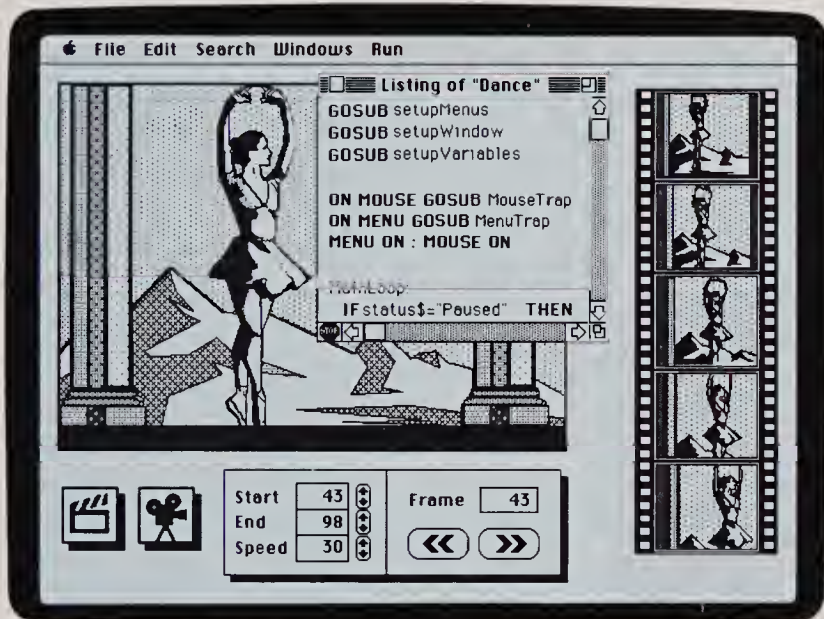
Sharing the field with sheet-fed and flatbed scanners are such unconventional units as the legendary ThunderScan. The ThunderScan's scanning hardware replaces

(continues)

Teach your Mac to perform unnatural acts.



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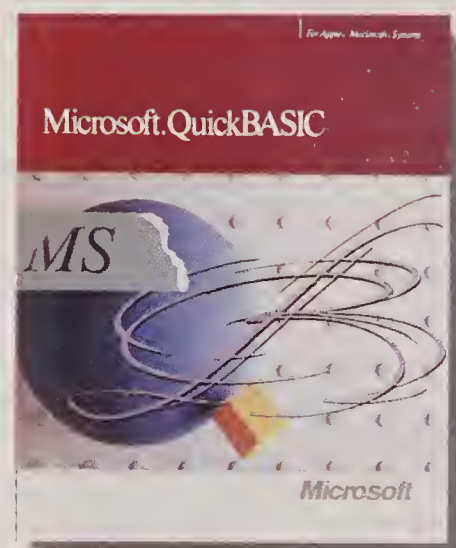
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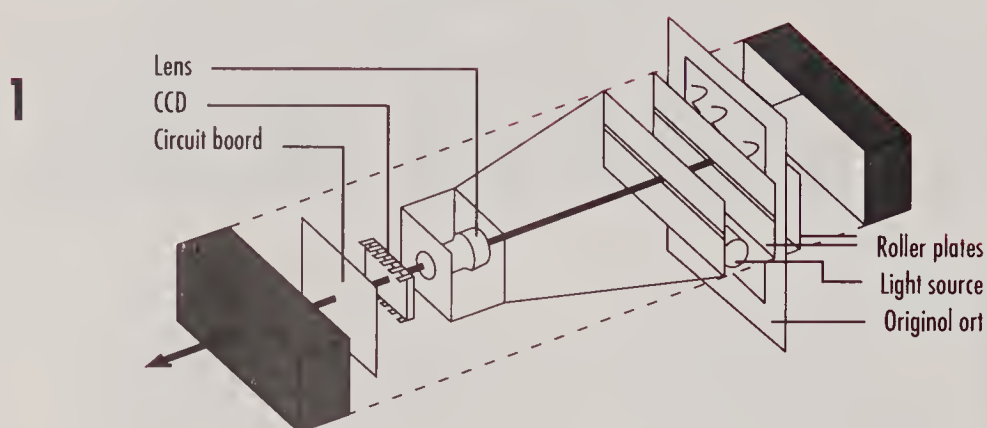
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Anatomy of a Scan



The scanner illuminates the original, and the CCD measures the amount of reflected light, generating higher voltage levels for lighter shades than for darker ones..

2



The scanner translates the incoming voltage levels into digital values, using a given number of bits to represent each dot. The more bits per dot a scanner uses, the better it can represent shades of gray.

3



When you specify a bitonal scan, the scanner doesn't save the gray-scale information. Instead, it determines whether a given voltage level represents an all-white pixel or an all-black one.



Selecting the scanner's halftoning option combines pixels into larger halftone cells, thus fixing the halftone resolution.



When you specify a gray-scale scan, the gray-scale information is saved in a TIFF file; halftone resolution is not specified until the image is printed.

the ribbon cartridge in an ImageWriter printer. You roll your original into the printer, choose a command, and the cartridge moves left and right, advancing the original slightly with each pass. Thunder-Scan was one of the first scanners available for the Mac; at \$249, it's still the least expensive. But it's also the slowest. A full-page scan can take nearly 30 minutes, versus the 30 seconds or so that other scanners require.

At the upper end of the scanning spectrum are *slide scanners* such as BarneyScan Corporation's Gamma Scanner (the Mac II version should be out by the time you read this) and Howtek's Scanmaster/35, which both create ultrasharp color scans of 35mm slides. But with prices in the \$8000 range, they're specialized tools that are only now coming into their own. Finally, there are *video digitizers*, such as Koala Technologies' MacVision and Pixelogic's ProViz, which accept video signals from a video recorder or a video camera.

Looking Sharp: Resolution

Like video screens and laser printers, all scanners represent images by using very small dots. The more dots per inch a scanner, screen, or printer can work with, the higher its *resolution*, and generally, the sharper its images.

Scanners typically provide a resolution of 300 dots per inch (dpi), a value matching the resolution of most laser printer output. A few scanners, such as Microtek's MSF-400G and Datacopy's 840I, provide 400-dpi resolution, although for reasons I'll explain shortly, 300 dpi is usually more than adequate. The Thunder-Scan's resolution with an actual-size scan (no enlargement or reduction) is only 72 dpi, but using some clever scanning tricks, you can boost an image's resolution to nearly 300 dpi.

Differences in resolution can be more apparent in scanned line art than in scanned photos. As resolution drops, sharply defined shapes in line art take on the jagged look (known as *aliasing*); to see for yourself, compare a circle on the Mac's screen to one printed by a laser printer.

Looking Shady: Gray Scales

Continuous-tone images impose their own demands. Because a bit can represent only white or black values, depicting shades of gray requires special techniques.

(continues)

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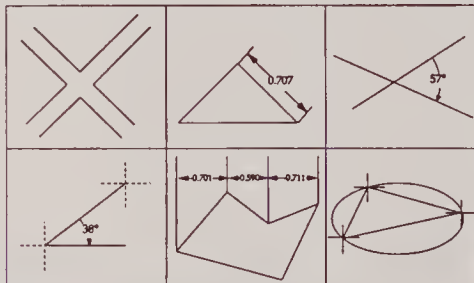
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How To/Getting Started

The first scanners used a scheme called *dithering*, in which the scanning software combined black and white dots into patterns that simulated shades of gray. The Mac's desktop pattern is a good example of a dithered shade of gray.

The drawback of dithering is that the scanner software must assign each gray shade a specific number of dots. In the image-rendering world, when you assign a specific number of dots to anything, you lose the ability to take advantage of a screen or printer whose resolution is higher than the resolution you've already chosen. That's why it's preferable to retain some *resolution independence*, rather than lock the image into a specific number of dots per inch before printing.

When you scan a photo with a gray-scale scanner, the scanner's software saves the incoming gray-scale information and the image is converted into dots only when you print it. (Gray-scale scanners also assign more bits to each dot; for example, a four-bit scanner can represent 16 different shades of gray; a six-bit, 64 gray levels; an eight-bit, 256. The more shades of gray a scanner can detect, the better the image will look, especially if it's printed on a Linotronic.) This dot conversion process is known as *halftoning*. It's what allows a printing press—which can't print shades of gray—to represent a continuous-tone image. The image is photographed through a screen that converts it into a series of tiny black dots that a press can print. The halftone represents different gray shades by varying the size of the halftone dots: larger dots for darker shades, smaller dots for lighter ones.

A laser printer handles halftoning differently: since it can't vary the size of its dots, it must combine several dots into a larger *cell* whose size it *can* vary (by turning some dots on and others off). You're able to print halftone images, but at a price: because the printer must combine dots to create the halftone cells, its effective resolution drops. That's why a 300-dpi scanner is more than adequate: even if you scan an image at 300 dpi, you'll still get hard copy with fewer dots per inch. For example, if 5 dots are assigned to each cell, a 300-dpi printer can print only 60 dots per inch—about as many as are in a newspaper photograph. That's sobering: when you bought your \$2500 scanner, you probably had in mind an end product that would look better than a newspaper photo.

(continues)

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How To/Getting Started

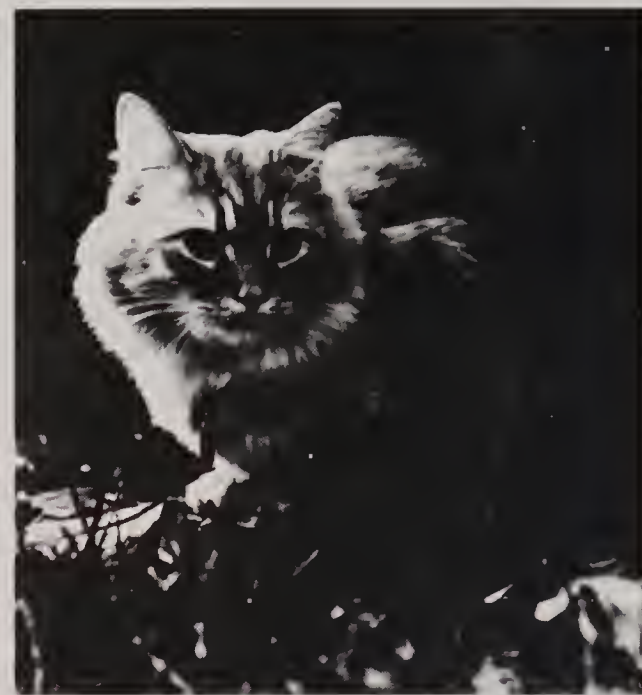
Scanning at higher resolution increases an image's sharpness and reduces aliasing. A two-to-one ratio is optimum, if you have the disk space. For example, you would scan at 300 dpi for output at 150 lpi (lines per inch). However, if you're creating a gray-scale image of a continuous-tone original that doesn't contain a lot of detail and you don't plan to enlarge the image in a publishing program, you can often scan at lower resolution—as low as 75 dpi for laser-printed output, or 150 dpi for Lino-tronic—with little difference in image quality. You'll not only shorten print times, but you'll also save a lot of disk space—a 75-dpi gray-scale scan is roughly 1/4 the size of a 300-dpi scan. (Line art, which doesn't require halftoning, should always be scanned at maximum resolution.)

But because gray-scale images aren't locked into a specific halftone dot size, you can get sharper halftones by printing your image on a higher-resolution printer, such as a 1270-dpi Linotronic typesetter. A Linotronic can print many more dots per inch, so it can create much smaller halftone cells. If a 1270-dpi Linotronic uses 5 dots per cell, its effective resolution is about



There's More than One Way to Scan a Cat

The more dots per inch a printer provides, the better the quality of its halftones. At left, output from a 300-dpi PostScript printer, using a 53-lines-per-inch halftone screen. At right, the identical image printed on a 1270-dpi Linotronic typesetter, using a 125-lpi halftone screen.



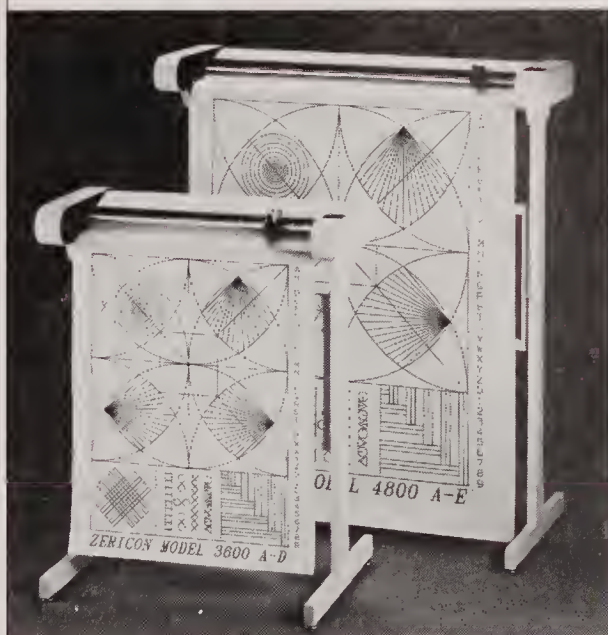
200 dots per inch—more than that of a high-quality magazine halftone (see "There's More than One Way to Scan a Cat").

Of course, when you leave the halftoning job to the printer, the printer must

be able to create halftones. PostScript-based printers contain halftoning routines, but QuickDraw-based printers, such as General Computer's Personal LaserPrinter

(continues)

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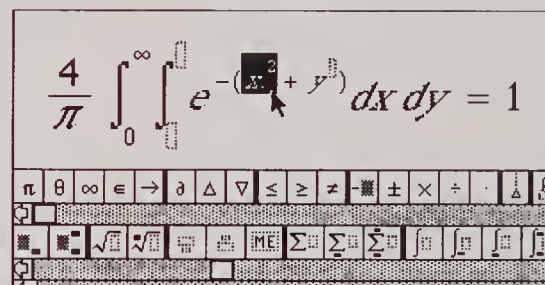
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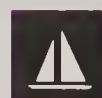
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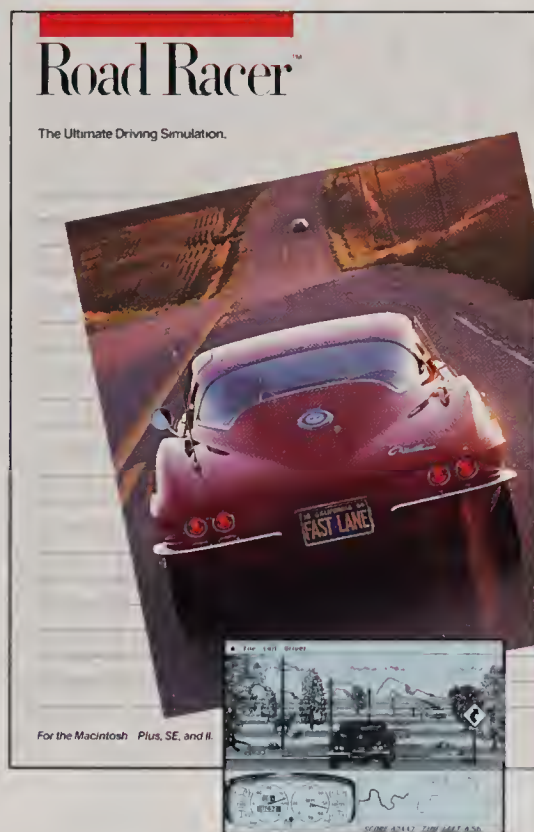


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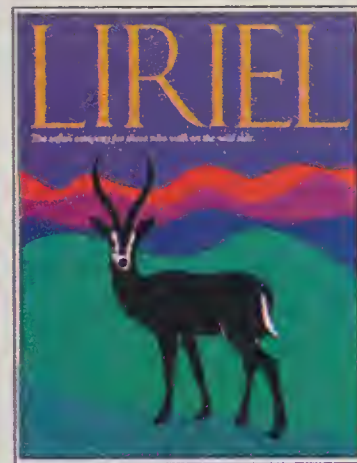
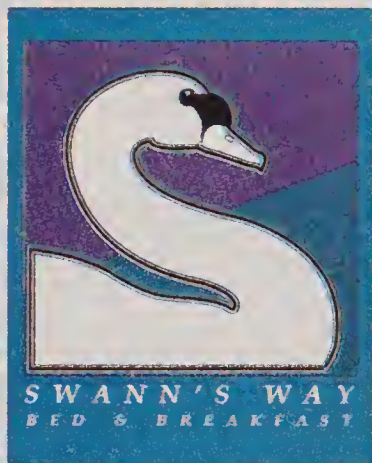
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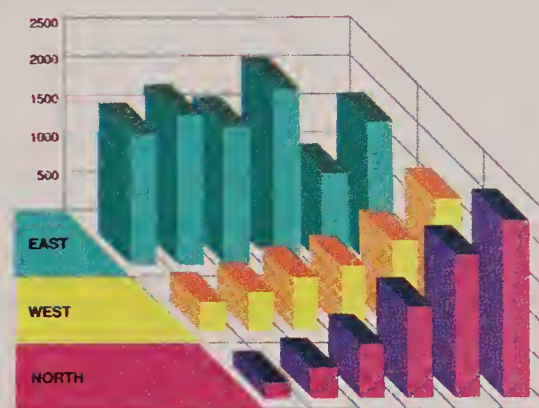


Pictured are just some of the ways designers are using the QMS ColorScript 100. The creative director at one design firm notes: "We're doing comps in minutes that used to take hours. The quality is fantastic."

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Image Formats

Format	Pros	Cons
PICT	Supported by most applications	Image usually can't be moved to IBM PCs or other computers; halftone patterns (dithers) created by scanner software are prone to distortion during resizing
PICT2	Supported by many Mac II graphics applications	Gray-scale images generally don't print properly
MacPaint	Supported by most applications	Resolution is limited to 72 dpi; to save a 300-dpi scanned image, you must either crop it significantly or lose resolution
Tagged-image file format (TIFF)	Saves gray-scale data; can be resized with no distortion of halftone pattern; gray scale can be remapped for brightness and contrast adjustments or special effects; supported by most scanner software and desktop publishing applications	Files can be large; generally not supported by nonpublishing applications; some scanner software cannot reopen a file saved in TIFF
Encapsulated PostScript (EPS)	Supported by most desktop publishing applications	Image can't be edited; files can be extremely large; image can be printed only on PostScript printers
Native	Image can be reopened by scanner software for limited editing	Rarely supported by other applications

Image Formats

Most scanner software lets you save images in more than one format. Here are the most widely supported image formats, along with each format's strengths and weaknesses. Native refers to the scanner software's own format.

and Apple's LaserWriter IISC, do not. If you plan to print gray-scale images as halftones with a non-PostScript printer, the program you use for printing must do its own halftoning. Among page-layout programs, only Aldus PageMaker 3.0 does. (Silicon Beach's image processing program, Digital Darkroom—near release at this writing—will also do halftoning.) For more details on gray-scale scanning, see "A Halftone Handbook" (*Macworld*, October 1988) and "Shades of Gray" (January 1988).

A Scanner's Command Post

Scanning software lets you adjust settings before scanning, edit the resulting image, and save it in a variety of formats (see "Image Formats"). To allow you to compensate for imperfect originals, scanning programs provide buttons or sliders that let you adjust brightness before scanning; some programs can alter contrast as well. These controls don't change the light-

ing within the scanner; they assign different brightness and contrast values to the incoming gray-scale data.

Scanning software lets you specify the area to be scanned as well as an enlargement or reduction percentage to create scans larger or smaller than the original. You can also specify whether the original is line art or a continuous-tone image. If it's the latter, you can designate whether the software should halftone the incoming image (through dithering) or simply save the gray-scale data. If your scanner, its software, and your printer support gray scale and halftoning, always scan continuous-tone originals using your scanner software's gray-scale setting and save the result as a TIFF file. Then you can alter the image without distorting its halftone dot pattern. If instead you let the scanning software create the halftone, the resolution of the halftone's dot pattern will not be alterable once the image has been scanned.

All scanning software also provides MacPaint-like editing features such as erasers, pencils, and line-drawing tools. But

most programs' editing features are adequate only for simple retouching tasks. For serious editing, consider an *image processing* program such as Letraset's ImageStudio or Silicon Beach's Digital Darkroom. These programs' sophisticated drawing and retouching tools let you blend, soften, sharpen, and otherwise alter images. Because a Mac II can display shades of gray, it's the best Mac for electronic retouching.

Another extremely useful image processing feature is the ability to change a photo's brightness or contrast after you've scanned it. Because gray-scale images retain the gray-scale data the scanner sends to the Mac, image processing programs can change the brightness and contrast by simply interpreting the data differently. This ability to *remap* the gray-scale data lets you compensate for brightness or contrast flaws in the original and allows for special effects (see "Fun with Gray Maps"). Incidentally, PageMaker 3.0 also lets you remap gray-scale data.

(continues)

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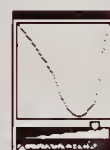
How To/Getting Started



(A)



(B)



(C)



Fun with Gray Maps

You can open gray-scale TIFF files with an image-processing program and remap the gray scale to adjust brightness and contrast or produce special effects. Here are three images displayed by ImageStudio, along with their corresponding gray maps (which translate data from the scanner into shades of gray). In (A), the gray map is unchanged. In (B), the image has been lightened so that text could be superimposed on it. In (C), a custom gray map gives the image a solarized appearance.

But Is Scanning the Answer?

With all the wonders that scanners perform, why are they one of the last peripherals you should consider buying? First, you don't need one to include photos in a publication. You can use the standard graphic artist's technique: draw a black box—a *halftone window*—to indicate where the photo will appear. Then have a print shop make a *photomechanical transfer*, or *PMT*, from the photo, and position it on your pasted-up page.

Second, scanners start at about \$1000 (the one exception is the marvelous ThunderScan, which will do the job if you have the patience and the ImageWriter). And if you don't already have a hard disk and 2 or more megabytes of memory, add their prices to the tally. For top-notch retouching, throw in a few hundred dollars for an image-processing program.

Finally, remember that the quality of laser-printed gray-scale images is far from *National Geographic* standards. A Linotronic gives better results, but while small images will usually print in no more than 20 minutes, a full-page, 8½-by-11-inch image could take up to an hour to print on an older machine (one with the original raster-image processor). Therefore, since Linotronic use is often charged by the hour, very large digital halftones could cost you a lot more than conventional ones.

But if you work with images frequently, if you'd like to be able to retouch them electronically, if you can put a scanner's OCR features to work, and if you can satisfy a scanner's appetite for disk space and memory, then you should consider owning one.

If OCR is important to you, examine the method each scanner uses to recognize characters. *Matrix matching* compares each scanned character with a database of characters in the scanner's memory, but it requires a separate font database for every font you plan to scan. *Feature extraction* recognizes characters by their general shape, but although it lets you scan a wider variety of fonts, it's slower and tends to use more memory.

Scanners have always promised a lot, but only now are they starting to deliver. Whether one can deliver enough for you is a gray area that no scanner can detect. You're the one who has to assign a 0 or a 1 to that question. □

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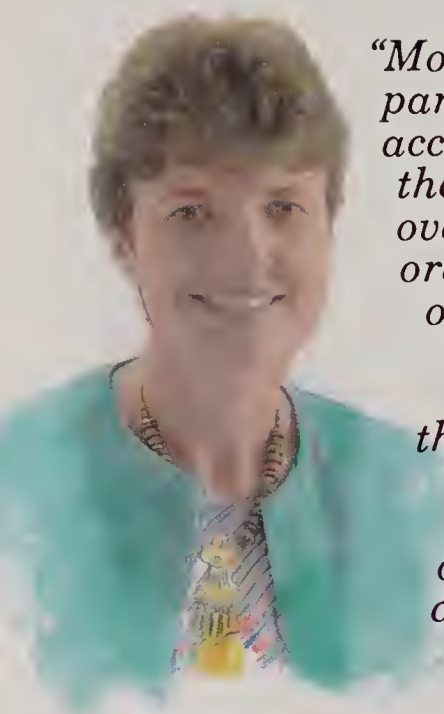
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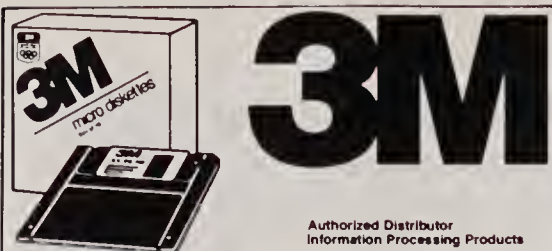
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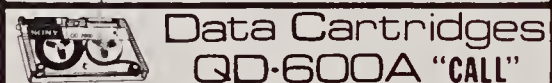
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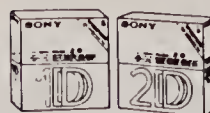
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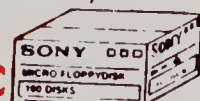
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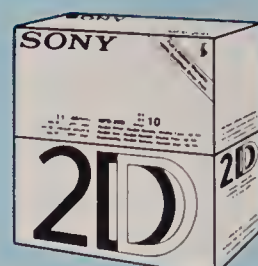
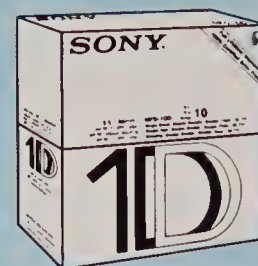
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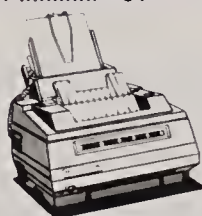
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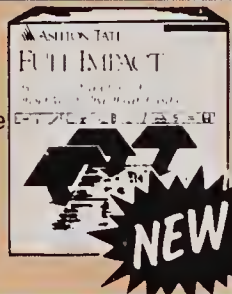
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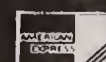
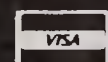
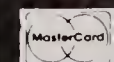
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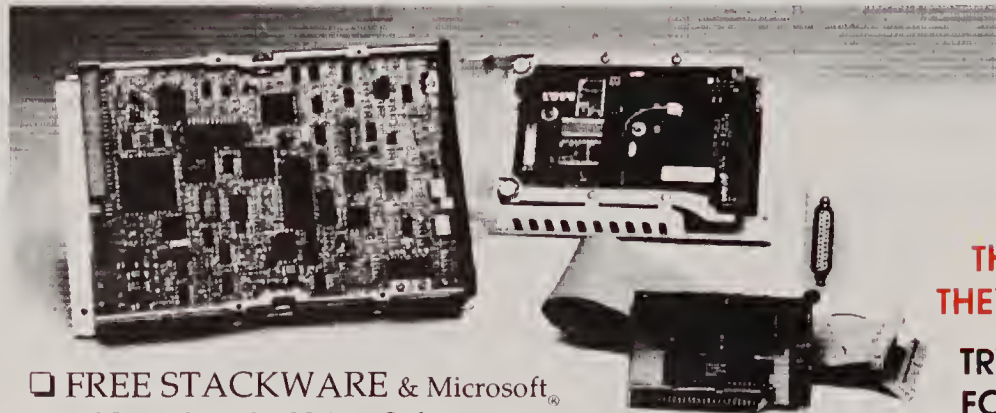
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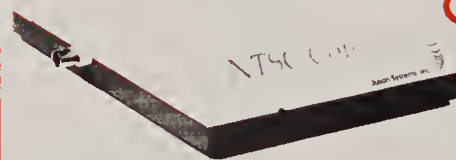
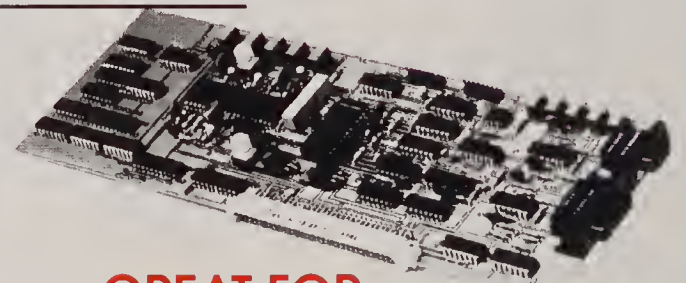
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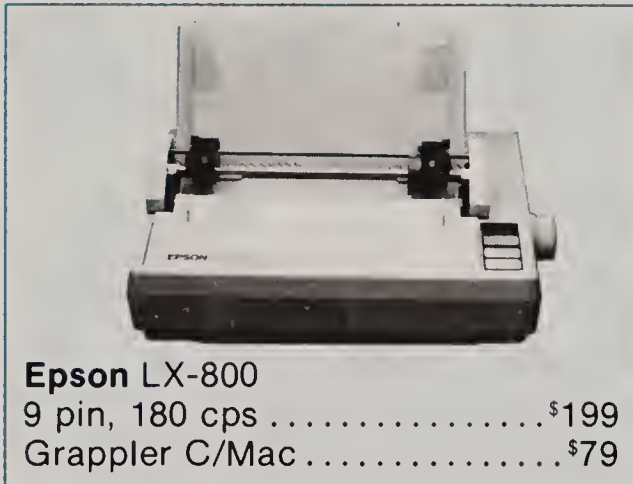
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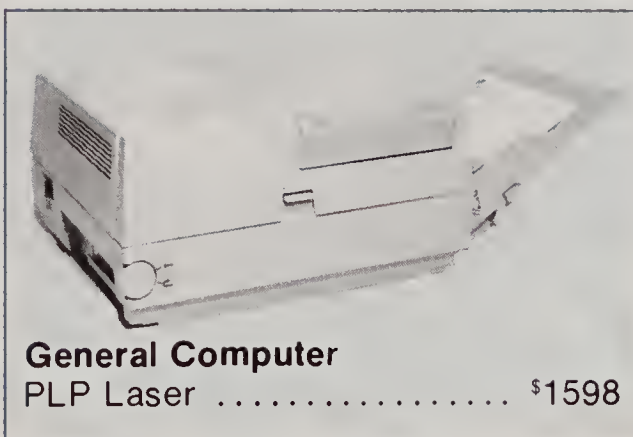
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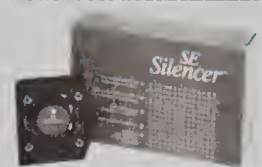
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Insights on Cricket Graph

Chart a course to improved business graphics

by Adrian Mello

The quickest way to turn an audience into zombies is to start counting off a slew of numbers. Face it—hard facts are hard to take. But people like pictures, and you can change numbers into pictures using a chart program. Cricket Graph, the most capable chart program available today for the Mac, produces a wide variety of charts and provides good control over most aspects of a chart's appearance.

To create charts in Cricket Graph, you always follow the same basic procedure: you type data into a spreadsheetlike data window and then choose from one of 12 basic graph types listed in the Graph menu. Once you create a graph, double-clicking on almost any part of it produces a dialog box that enables you to modify the attributes of that graphic element. You can also choose from the Goodies menu to add depth, value labels, and other graph enhancements. Although that synopsis covers most of Cricket Graph's basic operations, beginners often experience a couple of common stumbling blocks.

Choosing Variables

Beginners are often perplexed by the dialog box that follows a choice from the Graph menu. This dialog box lets you choose the variables that will be graphed. Most graphs fall into one of two main categories: *x*- and *y*-axis graphs, and category and value graphs. The only exceptions are quality control, polar, and text graphs.

First, a look at *x*- and *y*-axis graphs. When you create scatter, line, area, or double-*y* graphs, you must choose one variable for the *x* axis and one or more variables for the *y* axis. (For a double-*y* graph you choose two variables for the vertical axis.) These four types of graphs work like playing the game Battleship. The individual points are plotted by cross-referencing numbers on the vertical and horizontal sides of a rectangle. In scatter graphs these points stand on their own; in line graphs

the program draws lines between the points; and in area graphs the areas defined by the lines are filled.

When you create a bar, column, stacked bar, or stacked column graph, you must also choose a variable for the category you want to compare, such as car models, and one or more variables for the values in each category, such as the number of cars sold. This boils down to choosing what items you want to compare and choosing a set of amounts that correspond to each item. Pie charts work essentially the same way, but you choose a category and only one set of values, so the pie wedges add up to a whole.

Multiples and Overlays

It is simple to compare multiple sets of data on one graph but the procedure may not be immediately obvious. There are two

ways to compare data sets. For some graphs, such as column and line graphs, Cricket Graph lets you specify two or more data sets in the values (or vertical axis) portion of the variables dialog box. When the dialog box appears, click each set of data you want and then click OK. Multiple bars or lines then appear in the graph.

Another way to compare information is by layering one chart on top of another. You create an overlay after you have already created a graph. Instead of returning to the data window, you just go to the Graph menu again and pick the chart of your choice. When the variables dialog box appears, select a second data set and click the Overlay Plot button. Repeat this process for each data set you want to plot; you can even mix some graph types. For exam-

(continues)



ROBERT CARDIN

Gary Karp uses Cricket Graph to prepare charts and slides in his role as manager of desktop presentation services for Chartmasters. The San Francisco-based company provides slide production, meeting planning, studio and location photography, and other presentation services.

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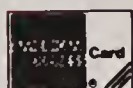
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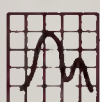
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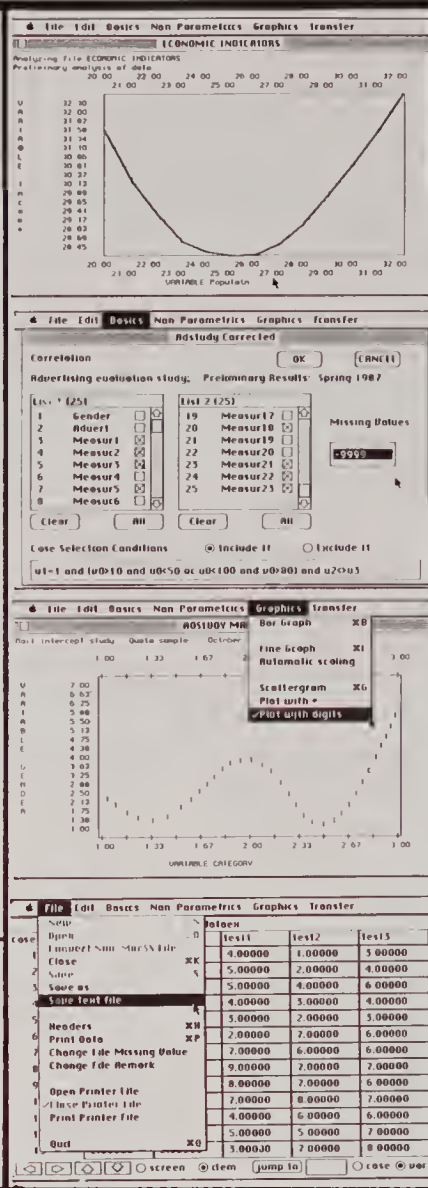


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How To/Insights

ple, you might superimpose a line graph on a column graph to correlate advertising expenditures with sales performance.

More experienced users may appreciate the following tips, which cover version 1.2.1 of Cricket Graph. My thanks to the people of Cricket Software's Technical Services Department for their useful insights.

Text Masks

Although you can control most aspects of a chart's appearance, sometimes you want to hide information that can't be deleted. For example, if you want to hide the names of some of the columns in a column graph, you can't just select an axis label and cut it; if one column has labels they all get labels. One way to eliminate unwanted text or graphics from a chart is to use the text tool to make opaque text blocks. Choose the text tool and click on the graph near the information you want to mask. Type in spaces to cover the text. By using the space bar and the Return key, and by experimenting with the font size and text orientation, you can make a masking rectangle that generally conforms to the area you want to cover up. (Of course, you can also use this technique with text to quickly replace labels without returning to the Data window.)

Quick Columns

Here's another shortcut. Normally, after you select the chart type, a dialog box appears that lets you choose variables for graphing. For example, if you've chosen a line graph, the dialog box asks you to select a column for the x-axis data and a column for the y-axis data. You can preselect the variables in the Data window by holding down the Option key and selecting the column header numbers before selecting the graph type. When you choose the graph type, those columns appear highlighted in the variables-selection dialog box. You then simply press the New Plot button to create the graph.

Positive Thinking

Many people overlook the options under the Data menu. You don't have to be a mathematician to take advantage of these options. For example, by using the functions under the Transform option, you can change a series of negative numbers into absolute values without retyping. This method works even if you have a series of positive and negative numbers mixed in

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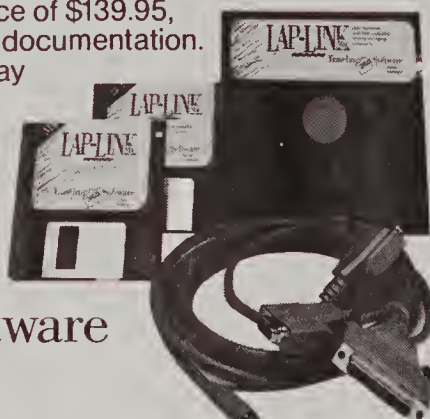
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one column. For example, in the Operations section of the dialog box, select the "x to the n power" button and make sure that $n = 2.00$. Clicking OK squares the numbers, making them all positive. Now take the square root by following the same procedure, but this time make $n = .5$.

Projected versus Actual Data

Project managers and other professionals who are held accountable for their plans often need to show the difference between projected data and actual results. Column and line graphs are the most common way to do this. In this situation, the data window usually has one column that contains text, such as the months of a year. Two other columns show the projected numbers for the whole year and the actual numbers for a portion of the year.

If you try to create a column graph by plotting projected versus actual data, you will get an alert box that says "The categories you chose do not match the categories that were first selected." To avoid this, insert zeros into the data cells that don't have any "actual" figures yet and replot the graph (see "Plotting Projected Data"). The new graph now contains column bars with heights of zero.

This technique does not work with line graphs, of course, because plotting the zeros would make it look as if your "actual" had suddenly bottomed out. Instead of entering zeros into the data cells, leave the cells empty and choose Row Numbers for the x-axis category. When you select Row Numbers for x-axis values, Cricket Graph does not require corresponding y-axis values. After creating the graph, you must mask the x-axis labels, which now show row numbers, with text labels for each month. If you plan to use this type of graph again, use the Save Format command to avoid retyping and positioning the labels each time you update the report.

Two Sorts

Depending on the column format, you can sort data in two ways. If the column format is set for alphanumeric data, the program sorts the values alphabetically by order of characters in each cell. In any of the other formats (decimal, scientific, dollars, or percent), the program sorts numerically by the order of magnitude of numbers in the cell.

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SuperPaint 2.0

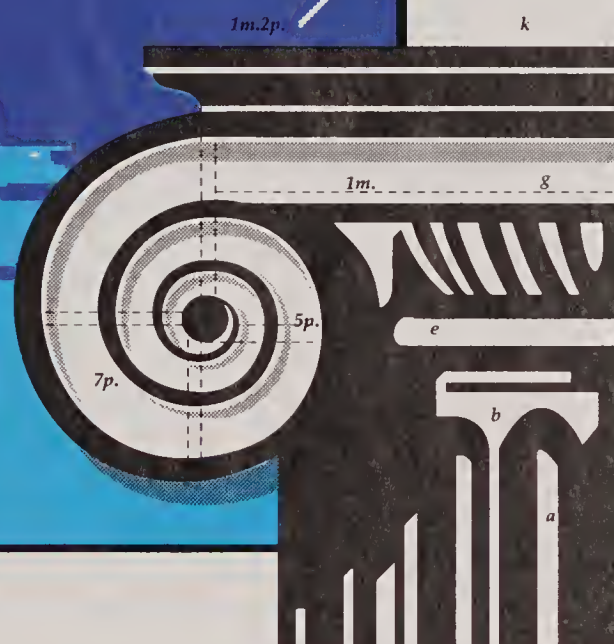
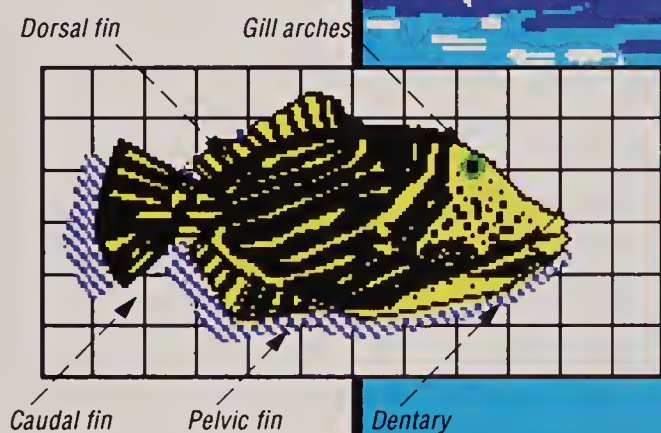
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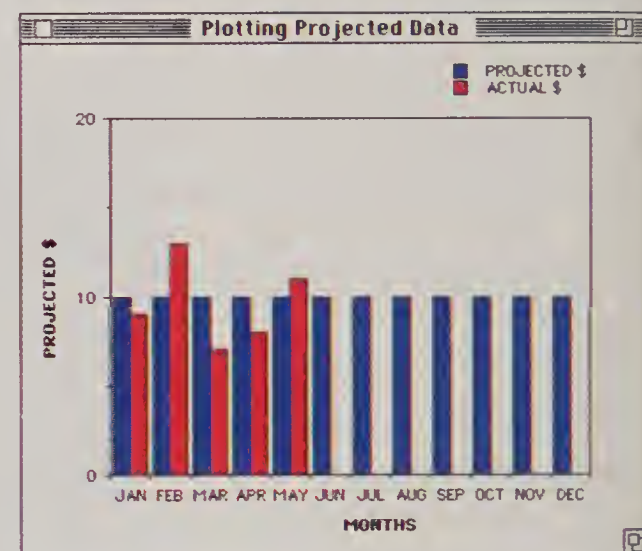
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Projected Data			
	1	2	3
	MONTHS	PROJECTED \$	ACTUAL \$
1	JAN	10	9
2	FEB	10	13
3	MAR	10	7
4	APR	10	8
5	MAY	10	11
6	JUN	10	0
7	JUL	10	0
8	AUG	10	0
9	SEP	10	0
10	OCT	10	0
11	NOV	10	0
12	DEC	10	0



Plotting Projected Data

You must trick Cricket Graph into making a projected-versus-actual graph. Blank cells in the data window won't plot properly, so here the amount 0 is entered in the Actual column for June through December.

Changing Text into Numbers

The word *recode* may call to mind a series of cryptic numbers and equations. But recoding simply means changing a range of information into some other number or word. You'd never guess by looking at it that the Recode dialog box could be used for text, but it can. For example, if you wanted to find all teenagers in a demographic sample, you could recode all people older than 12 and younger than 20 to equal yes. You can also change text into numbers. For example, a market researcher might want to assign numbers to a range of names in order to show results in a graph. All names beginning with the letters A through F could be given a value of 1, names between G and L could be given a value of 2, and so on. You could then create a chart that would reflect graphically the alphabetic breakdown of names. If you want to extract numeric data from text data in a

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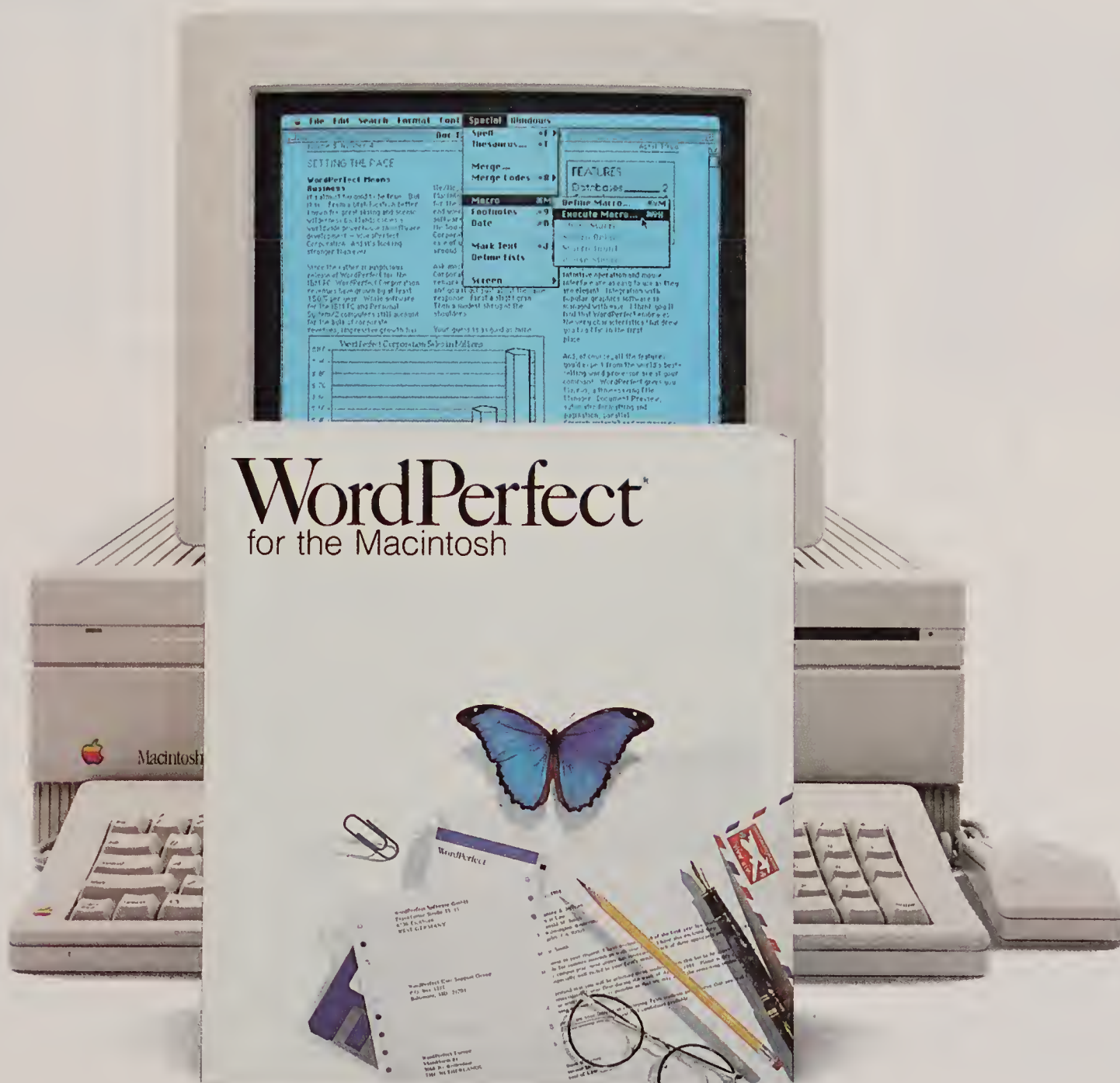
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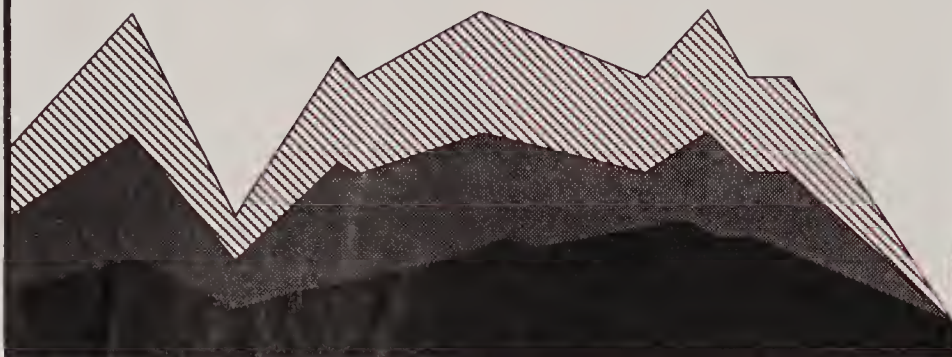
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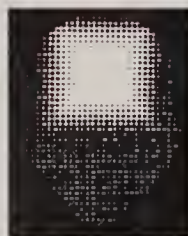
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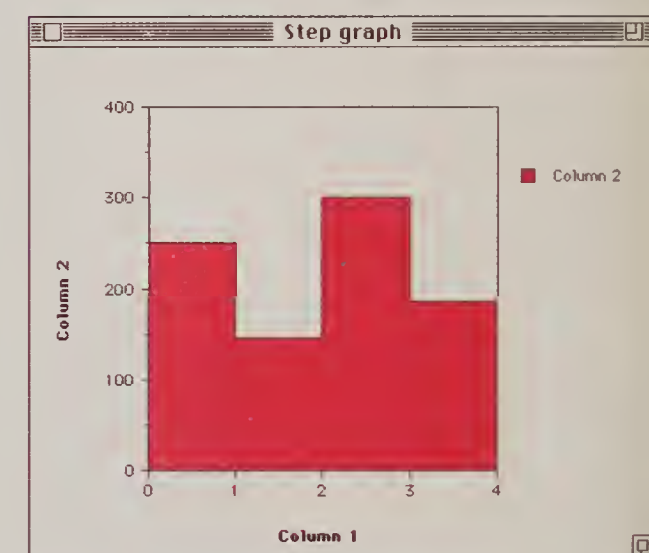
How To/Insights

mixed column quickly, convert the column to decimal format; this procedure eliminates all the text data.

Just Average

Cricket Graph lacks a specific function for finding the average of a column of data. However, you can work around this by choosing Transform from the Data menu. Choose the Running Sum option in the dialog box that appears and select the appropriate column of data. Then divide the resulting column by selecting Simple Math from the Data menu, choosing the division function, and entering the number of rows in the Constant box. The last value in the destination column will be the average. There is another method of producing an average, which works only in a column with an odd number of rows. Using the Smooth function, choose Smooth Data

Step Data			
	1	2	
	Column 1	Column 2	
1	0.000	250.000	
2	1.000	250.000	
3	1.000	145.000	
4	2.000	145.000	
5	2.000	300.000	
6	3.000	300.000	
7	3.000	186.000	
8	4.000	186.000	



Step-by-Step Charting

To create a step chart you enter pairs of numbers. The numbers in rows 1 and 2 of column 1 specify column width for the left-most column in the graph. The numbers in rows 1 and 2 of column 2 give the height. Note that to eliminate space between columns, adjoining columns must share one x value.

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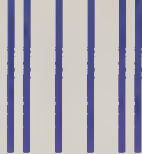
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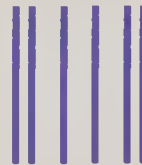
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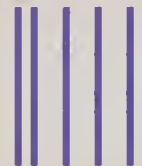
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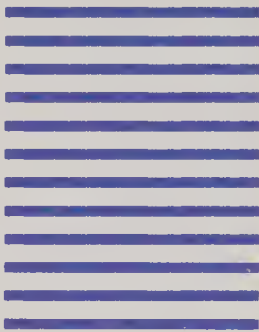
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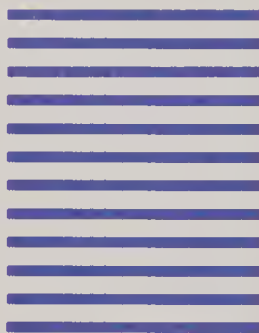
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from the Data menu and then specify the number of rows in the Smooth Width box of the dialog box. This generates the average in the next column of the Data window.

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If you want to export tab-delimited text to another program, hold down the Option key as you select Save Data As from the File menu. An option to save in StatWorks format then appears in the dialog box. StatWorks format is a text-file format that can be opened by word processing or other programs as a text file. This option is especially useful if you are moving data between versions of Cricket Graph. Although different versions can't always read files saved in the program's own format, they can all read StatWorks format.

Lineless Legends

Normally, when you create a line graph, a data point symbol appears in the legend with a line through it. To eliminate the line so that only the symbol shows in the legend, hold down the Option key when you press the New Plot button in the variables-selection dialog box.

This technique is especially useful for highlighting specific data points on a line graph. Holding down the Option key, you create the line graph and then overlay a scatter graph for each point or set of points you want to highlight with unique symbols. In the data window, copy each set of data points you want to represent with a unique symbol into a separate column. Make sure you paste each set of data points into rows that correspond to the same data points in the line graph. After you plot each overlay, you can alter the symbol by double-clicking on it.

Spacing Bars or Columns

Although there are no commands that enable you to control the space between columns on a graph, you can change the spacing somewhat by doctoring the data window. You can increase the space between columns by adding dummy (blank) columns between them. Do this by inserting a row containing zero values between each existing row. Use the text tool to cover the extra column labels, as described in the technique for masking text.

By eliminating space between columns in the graph, you can come up with a step graph. In the Data window, you enter data in pairs to define the height and width

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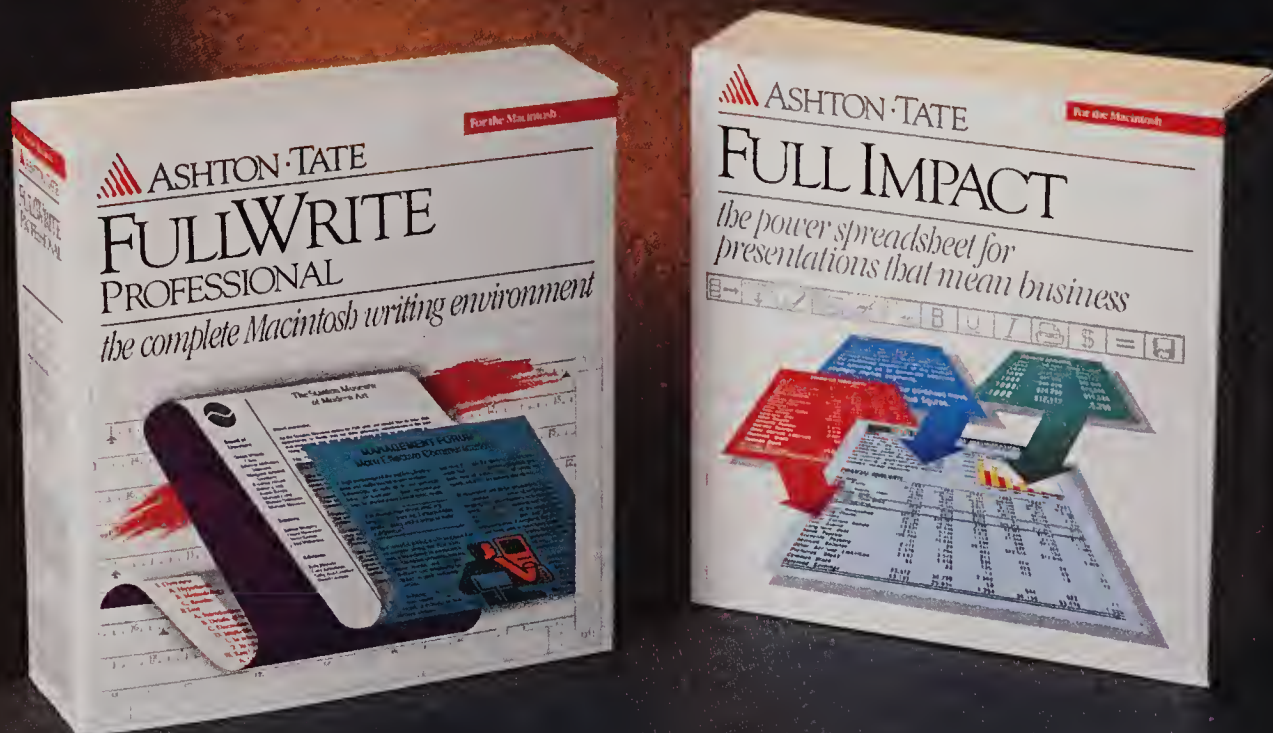


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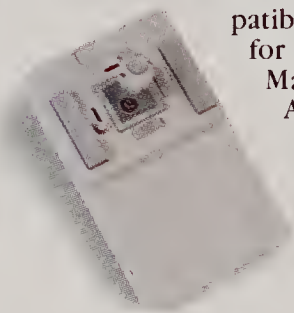
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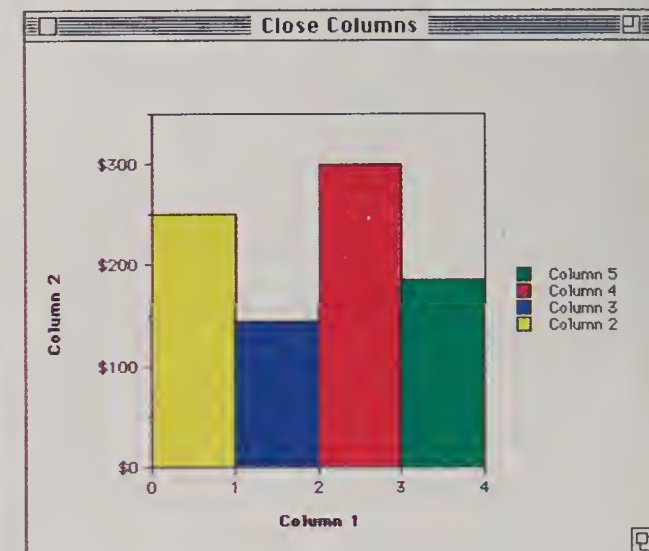
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How To/Insights

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	1	2	3	4	5
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2	1.000	\$250.000	\$0.000	\$0.000	\$0.000
3	1.000	\$0.000	\$145.000	\$0.000	\$0.000
4	2.000	\$0.000	\$145.000	\$0.000	\$0.000
5	2.000	\$0.000	\$0.000	\$300.000	\$0.000
6	3.000	\$0.000	\$0.000	\$300.000	\$0.000
7	3.000	\$0.000	\$0.000	\$0.000	\$186.000
8	4.000	\$0.000	\$0.000	\$0.000	\$186.000



Close Columns

To create distinct areas within a step graph, put the y values that define the height of each column in the graph in a separate data column, and then fill the other cells with zeros.

of the columns in the final graph. You actually define points that will create rectangles, and then you create an area graph. Each graph column will have two x-value entries (to set the width of the rectangle) and two y-value entries (to set the height of the rectangle). To prevent space from appearing between two columns in the graph, they should share the same x value where they abut. For example, the second x value of the left-most column in the graph and the first x value of its neighbor should be identical. Now, plotting the data as an area graph produces a set of columns with no space between them (see "Step-by-Step Charting").

If you want to define each column (or step) with a separate pattern or color, put the y values that define each graph column's height in a separate column of the data window. The y values must still correspond to the same rows held by the x values in data column 1. Fill all the other cells in the data columns holding the y values with zeros. Now plot an area graph. Create the x axis by choosing data column 1 and create the y axis by selecting each data column that should appear as a separate area in the graph (see "Close Columns"). You can modify each column by



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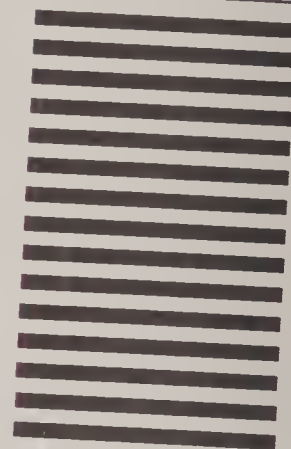
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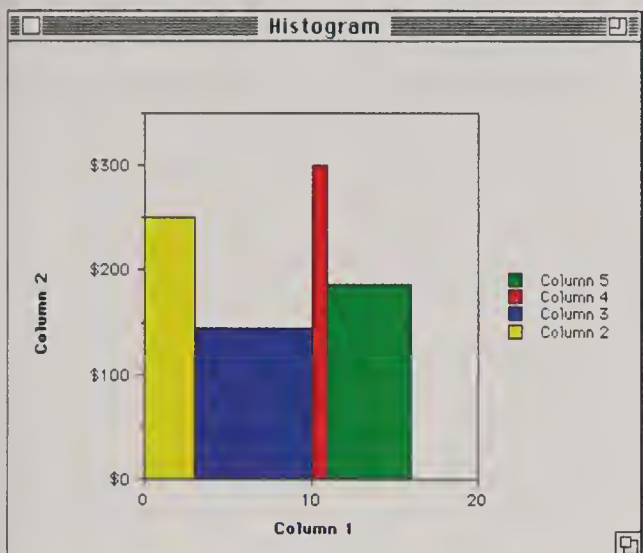
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3	1.000	\$250.000	\$0.000	\$0.000	\$0.000
4	2.000	\$250.000	\$0.000	\$0.000	\$0.000
5	2.000	\$250.000	\$0.000	\$0.000	\$0.000
6	3.000	\$250.000	\$0.000	\$0.000	\$0.000
7	3.000	\$0.000	\$145.000	\$0.000	\$0.000
8	4.000	\$0.000	\$145.000	\$0.000	\$0.000
9	5.000	\$0.000	\$145.000	\$0.000	\$0.000
10	6.000	\$0.000	\$145.000	\$0.000	\$0.000
11	7.000	\$0.000	\$145.000	\$0.000	\$0.000
12	8.000	\$0.000	\$145.000	\$0.000	\$0.000
13	9.000	\$0.000	\$145.000	\$0.000	\$0.000
14	10.000	\$0.000	\$145.000	\$0.000	\$0.000
15	10.000	\$0.000	\$0.000	\$300.000	\$0.000
16	11.000	\$0.000	\$0.000	\$300.000	\$0.000
17	11.000	\$0.000	\$0.000	\$0.000	\$186.000
18	12.000	\$0.000	\$0.000	\$0.000	\$186.000
19	13.000	\$0.000	\$0.000	\$0.000	\$186.000
20	14.000	\$0.000	\$0.000	\$0.000	\$186.000
21	15.000	\$0.000	\$0.000	\$0.000	\$186.000
22	16.000	\$0.000	\$0.000	\$0.000	\$186.000
23	16.000	\$0.000	\$0.000	\$0.000	\$0.000



Making Histograms

To create histograms, which vary the column width and height, vary the number of times you repeat the y value. The narrow column 4 in this example covers only 2 rows in the data window; column 3 covers 8 rows.

clicking on its legend symbol to select a color, or by double-clicking to select a pattern.

By taking this approach one step further, you can produce histograms. A histogram is a column graph whose columns vary not only in height, to show variation in amounts, but also in width, to show variation in the duration of the period represented by each column. To create a histogram, you repeat the same y value in multiple rows in a data column. The width of any column in the final graph is determined by the range of x-axis data for which a y value is repeated (see "Making Histograms"). You can modify the color or pattern of each column by clicking or double-clicking on the area graph's legend.

If you have a Cricket Graph shortcut, trick, or technique you've learned the hard way, why not share it with other readers? Send your tips to *Quick Tips*, *Macworld*, 501 Second St., San Francisco, CA 94107. □

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Finale's publisher-quality scores are a sight for sore eyes.

Printer Tools

Are there any real alternatives to printing with an ImageWriter?

by Charles Seiter

If you work in an ordinary business office, or have at any time wandered into a computer store, you will have noticed by now that most computer printers in the world are not ImageWriters. Some of them offer lower cost, higher speed, better print quality, or other advantages. The question seems fairly simple: should you consider using a non-Apple printer with the Mac?

After months of sometimes frustrating experimentation, I've determined that the answer depends on the situation. It depends on whether you're planning to use one printer with one Mac or you're setting up a more complicated office situation, and whether you've already got access to a non-Apple printer or you're thinking of buying one. With nonlaser printers, the focus of this article, three printing situations come to mind.

First, you already have an ImageWriter but wonder if the typeface is somehow crisper and the printing faster on the other side of the fence. In this case, sit down for a few minutes, have a cup of coffee, and ponder these facts. Every application for the Mac is *designed* to work on an ImageWriter. The people who write the software probably test it on an ImageWriter first. You can be as sure as is possible in the world of computing that you will have minimal printer problems with a Mac/ImageWriter combination. So unless you actually enjoy a bit of electromechanical adventure, buy yourself a new ribbon and learn a little patience.

Second, your boss says you can use a Macintosh but only if you connect it to a printer that's already there. So you'll use a non-Apple printer simply because you have no choice. The interface vendors claim this situation is responsible for 80 percent of their sales. As I will detail below, this may work out splendidly or may be a hassle, de-



pending on the complexity and reliability of the hardware you must use.

Third, you have access to a printer that you can use for special purposes. Typically, this would be a daisy wheel printer for true letter-quality printing or an ink-jet printer for higher-than-dot-matrix resolution (and blissful quiet). Convenient and effective solutions for these cases do exist, you'll be pleased to hear.

Pinpointing the Problem

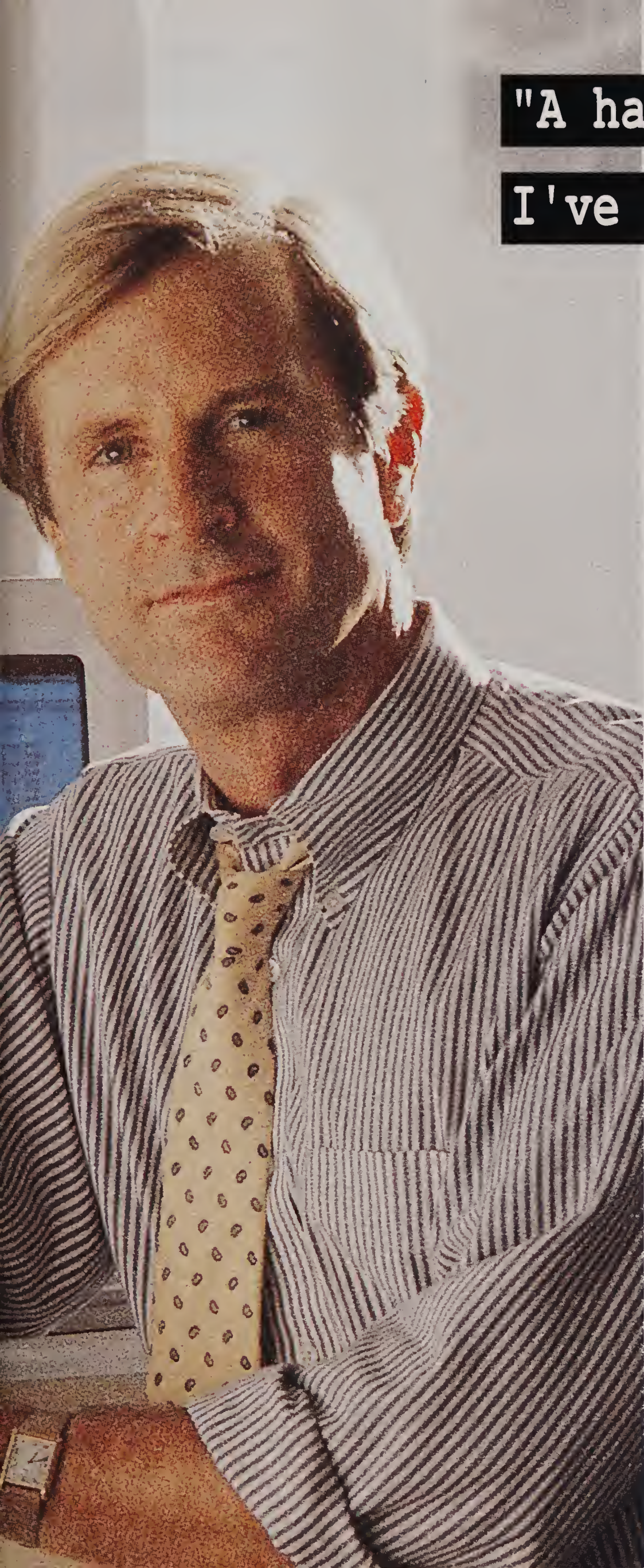
Beyond the secluded gates of the Apple orchard lies the jungle, teeming with four hundred or so not-exactly-mutually-compatible printers. Major applications for the IBM PC typically provide two or three disks full of printer drivers, instead of the ImageWriter/LaserWriter combination that's sufficient for all needs in the Macin-

tosh world. To make things more exciting, printer manufacturers will sometimes make tiny changes in the internal ROM that defines a printer's default fonts and graphics capabilities. What this means in practice is that it's difficult for the companies that sell Mac drivers for these printers to guarantee that everything will work perfectly, in all applications, with the particular printer you may have. There may be only minor problems, and they may be fixable through the driver vendors' usually diligent customer support, but the vendor is simply in no position to offer 100 percent assurance that its printer will be as easy to use as an ImageWriter. That's why so few mail-order Mac vendors carry non-Apple printers—they require too much technical support.

(continues)

Charles Seiter is a Macworld contributing editor with four years' experience interfacing various printers to Macs.





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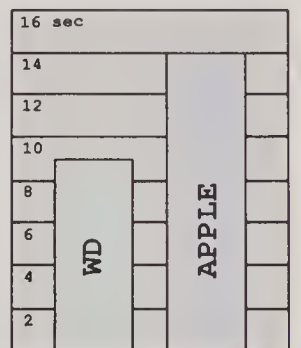
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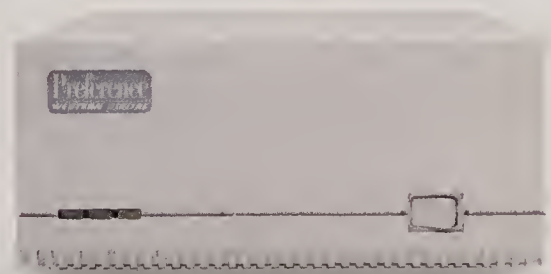
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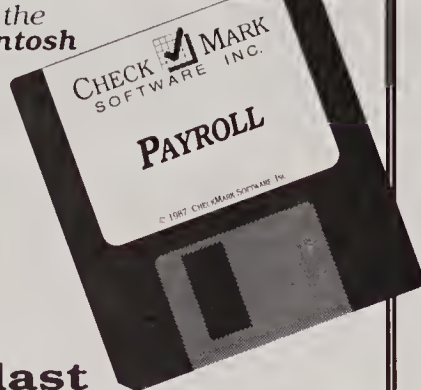


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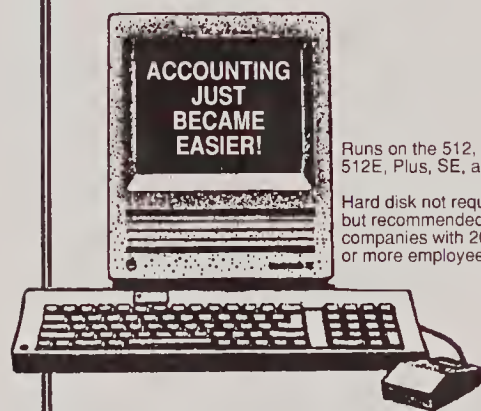


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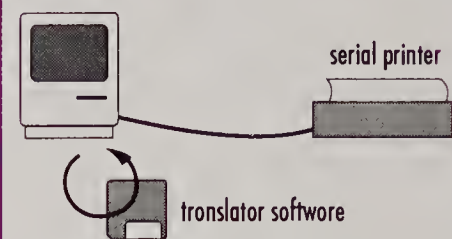
Two Different Routes

A serial printer expects to see information for printing characters arrive telegraph-style at its input port. That is, for each character to be printed, 8 bits of ASCII code are sent down the cable wires one bit at a time. A parallel printer expects to see the 8 bits appear all at once at its collection-input port lines. In principle, a parallel interface can be faster; in practice, the print-head speed is usually the limiting factor.

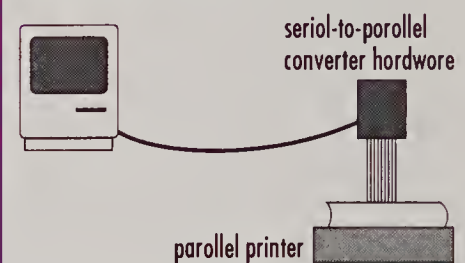
For a Mac to be used with a parallel printer, a device with a converter chip must be present somewhere between the Mac printer port and the input port of the printer itself. In the Grappler, the conversion takes place in a small box on the printer cable; in the Hanzon system, it occurs on a small card that fits in the Epson printer; in the MacEnhancer, the converter is part of a box that attaches to the Mac.

To work with the Mac, a serial printer needs only a software translator to translate ImageWriter codes to codes for the other printer. The Print-Link or Printworks for the Mac

Setting up a serial printer requires only that software translate ImageWriter code to the printer.



Setting up a parallel printer requires another piece of hardware to convert the Mac's serial output into a form the printer can use.



makes operation fairly trouble-free. However, the average office printer has a parallel interface—the serial interface is usually a \$100 option, and most IBM PC applications are written for parallel printers. The exception to this rule is that serial-interface daisy wheel printers are fairly common, as are some types of serial-interface ink-jet printers.

Serial or Parallel?

There are two common printer interfaces, serial and parallel. In principle, serial interfaces should be slower than parallel ones, but in practice the printer itself limits the speed of printing. When you encounter a random printer in an office, sales figures suggest, it's most likely to have a parallel interface.

The Mac, on the other hand, has a serial printer port. Therefore, to drive a non-Apple serial printer, you need only some software and the right cable. If you are trying to drive a non-Apple parallel printer (the more likely situation), you will have to buy hardware to perform a serial-to-parallel

conversion—another stage of complication, potential problems, and expense. So you must first determine whether the printer has a serial or parallel interface and proceed accordingly (see "Two Different Routes").

The standard test printers for this study were two dot matrix printers, an Epson FX-80 with a serial interface and a less-expensive Citizen 120D with a parallel interface, and a popular daisy wheel printer no longer in production. Other printers were used as noted. Applications included Microsoft Word, Microsoft Excel, MacPaint, MacWrite, and for added challenge, Trapeze.

(continues)



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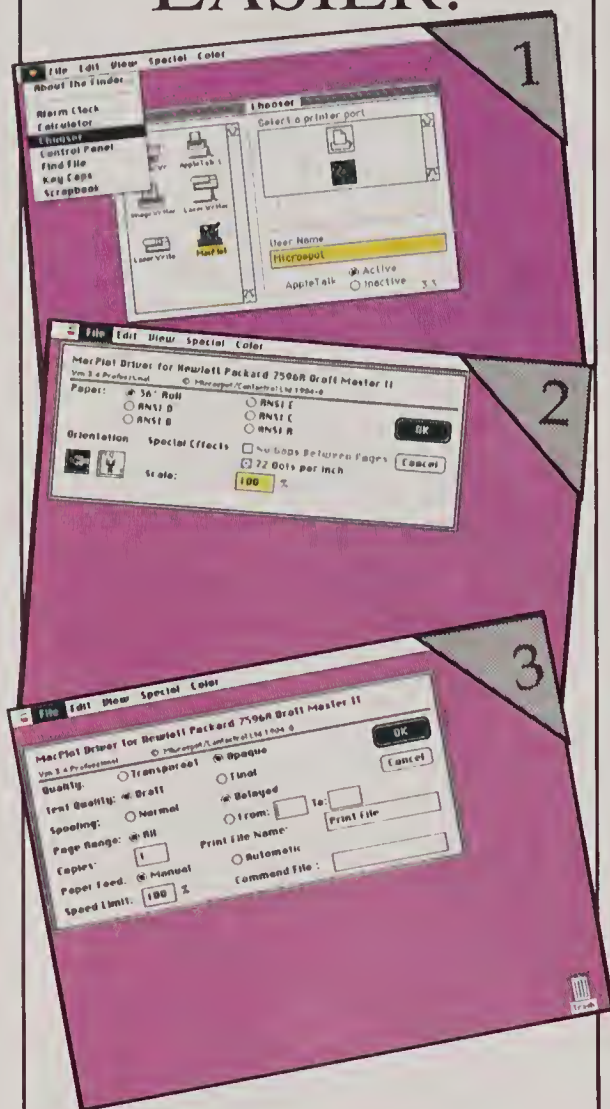
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How To/Mac Tools

Serial for Breakfast

If you do have a serial printer, you will have relatively little difficulty driving it from a Mac. Two popular and relatively inexpensive commercial packages, Printworks for the Mac (from SoftStyle, a division of Phoenix Technologies) and The Print-Link (from GDT Softworks), handle this situation effectively. Unfortunately, because most PC programs expect parallel printers, you'll probably be confronted with a parallel interface, but if you're lucky enough to have a serial printer, your worries are over.

When ordering The Print-Link from GDT Softworks, you specify the type of printer you want. To install it, you simply drag the printer interface icon to your System file and select the driver icon and connection port with the Chooser. On an Ep-

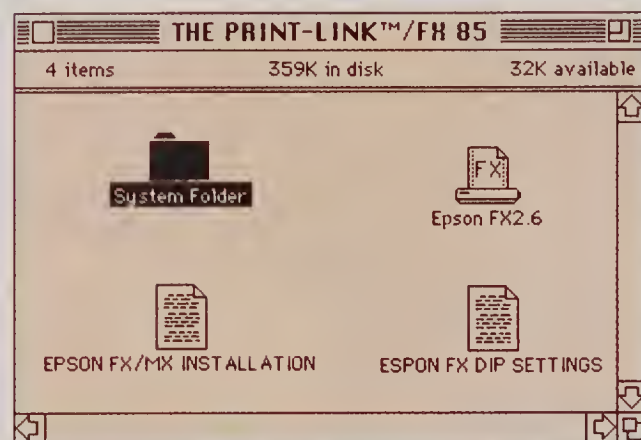


Figure 1

The Print-Link offers a straightforward solution to driving a non-Apple printer from a Macintosh. Software is available for the serial versions of most daisy wheel, dot matrix, and ink-jet printers.

son FX-80 with a serial interface, The Print-Link produced output that was virtually identical to ImageWriter output, both in graphics and text, within variations in ribbon quality.

Printworks for the Mac is equally simple but more generous with drivers—you buy either the dot matrix program or the daisy wheel program and each one provides a choice of drivers. Once again, it was difficult to distinguish the Epson output from standard ImageWriter II printing. Printworks also offers superior documentation for installation, with detailed driver instructions for each supported printer, including clear pictures of DIP switches and notes on required cables. Within five minutes of loading the Printworks disk, I watched the daisy wheel printer merrily churning out pages of Mac output, with correct page breaks and perfect letter

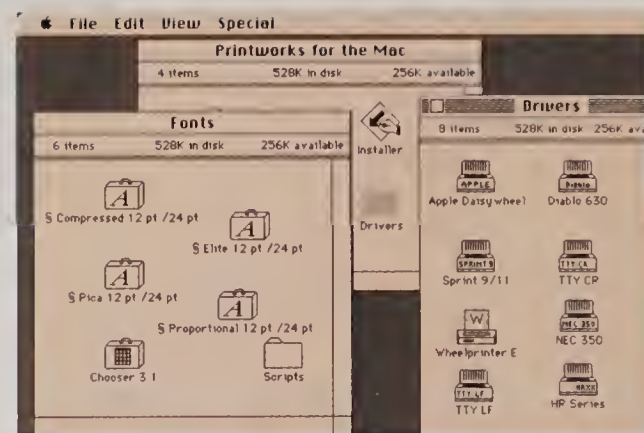


Figure 2

Printworks for the Mac is easy to use, well documented, and supports a range of common printers in each category (shown here are drivers for the daisy wheel version).

spacing. Although daisy wheel printers cannot produce graphics, these drivers offer a low-cost way to get crisp business correspondence from a Mac with widely available office printers.

Parallel for Lunch

Now things get a little more difficult. If you have a parallel printer, you have some choices to make. First, you can buy a serial interface (if one is available) for your parallel printer from the printer manufacturer; then you can use one of the programs above. (However, this may be unacceptable if you're supposed to share the printer in an office where a parallel interface is the norm.) Second, you can buy a small, Mac-specific interface that makes the printer appear as an ImageWriter to your Mac (we'll look at two devices of this type). Finally, you can buy a general-purpose, serial-to-parallel converter box to use with software drivers on the Mac. Although this involves the most money (a minimum of \$500) and requires quite complicated cabling and ongoing technical support, it could ultimately prove to be the most cost-effective solution for a large office, since it offers the most flexibility in computer/printer combinations.

For Epsoms Only

If the printer you need to drive is an Epson in the FX, RX, LX, or MX series, the simplest option is to buy Hanzon Data's Epson Serial Interface Card, which makes the Epson appear as an ImageWriter to the Mac. DIP switches on the card let you toggle the printer back to standard Epson mode as required. Installation is easy (the ImageWriter cable goes into the card), out-

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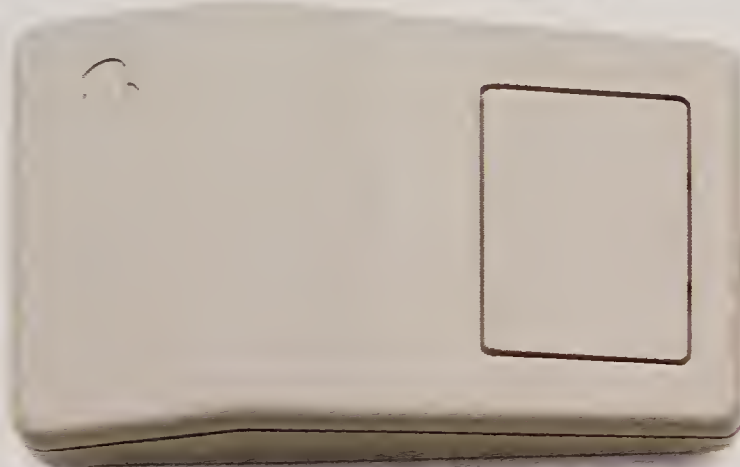
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How To/Mac Tools

put is ImageWriter look-alike, and you make no investment in software (applications use the ImageWriter driver).

For Epsoms and Others

Another hardware approach is the Grappler C/Mac/GS from Orange Micro. This device looks like a cable with a small box on the printer-plug end. You plug one end of the cable into the ImageWriter and the other into the printer. What sets the Grappler apart from other serial-to-parallel converters is its small size and its built-in printer interfaces. The little box, which also comes with a 120VAC-to-9VDC converter, contains the serial-to-parallel converter with DIP switches for interfacing to twenty or so common dot matrix printers (including color printers). A version of the device to drive 24-pin printers (called the Grappler LQ) is also available but was not tested here.

In principle serial-to-parallel conversion is the slickest approach, as well as the most Mac-like in its lack of fuss. It appears to the user as a "magic cable" that turns other printers into ImageWriter clones. In practice, the earliest versions had bugs, the intermediate versions had less-serious bugs, and at press time Orange Micro was still upgrading the ROM used in the device. While software vendors can change their programs more conveniently than Orange Micro can change its preprogrammed chip, there's no reason why this device cannot ultimately be completely free of bugs. (Orange Micro offers a one-year warranty, to accommodate printer compatibility problems.) If you can't use the Hanzon card because you have a non-Epson dot matrix printer, your best hope for hassle-free printing is to give the Grappler a chance. For several technical reasons (mainly oddities in a printer's escape codes), if this product doesn't work with your printer, you can expect trouble with other approaches as well, and you may need to rethink your objectives.

Miraculous Conversions

There are many serial-to-parallel converters on the market—typically boxes the size of a toaster with a variety of cable ports—but you must buy the printer drivers to go with them. Most converters offer memory buffers in different sizes, since they provide convenience and improve speed, even over print spoolers, but don't add much to the cost of the device. You should be aware that running serial-port output from a printer driver into a converter and out through a parallel port to a printer will not

invariably produce perfect results. Furthermore, you may find you can reliably print only ASCII (text-only) format (no fancy fonts or graphics). I found this serial-to-parallel conversion scheme to cause more problems than any other I tested. It also results in customer-service problems that vendors can't necessarily resolve (software developers can't be expected to provide 100 percent compatibility with other companies' converter hardware).

One converter worth examining is the \$245 MacEnhancer from SoftStyle, a division of Phoenix Technologies. It doesn't offer a buffer but it does provide four parallel ports controlled from the Chooser. If you use Printworks you have the added advantage of dealing with a single firm to resolve any problems that might crop up. Phoenix also includes communications software in the package.

Another reasonably priced converter is the Universal Printer Buffer from Jonathon Freeman Designs, which provides two serial-to-parallel converter sections and a 64K buffer. Because of its minimal documentation, I can recommend this product only for the technically proficient. Still, the Universal produced nearly correct output, in text-only mode, using serial-data output from The Print-Link driving a parallel printer under Epson FX-80 emulation. Nearly correct in this context means that page breaks went seriously awry on multi-page documents, and special characters transformed into unpredictable hash. While these quirks could probably be eliminated with some effort, the Universal Printer Buffer would probably be more useful in other contexts, such as communications, data acquisition, ASCII printing, or ordinary printer buffering (rather than buffering plus serial-to-parallel graphics conversion).

A product that's ready to accept the challenges of conversion, and anything else you may face, is the Printer Optimizer from Applied Creative Technology. This device allows simultaneous management of several printers, both serial and parallel, accepting input from several computers. The Printer Optimizer can perform different custom-code translations of nonprintable codes, and it features extensive documentation on the Macintosh interface. One advantage of this complex product is its roaring speedup of an ImageWriter through Printer Optimizer's special drivers, which are enhanced for use with its

(continues)

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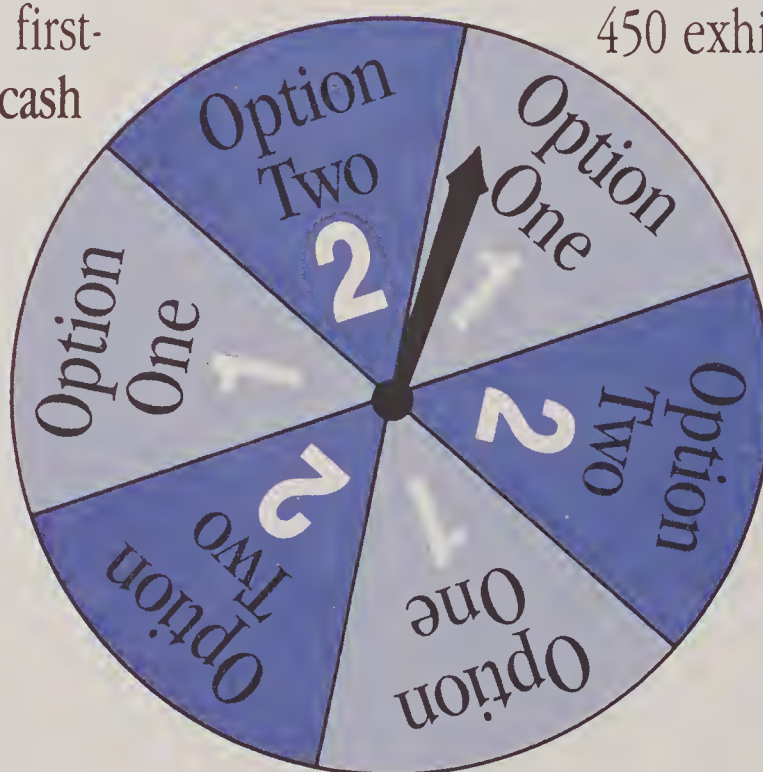
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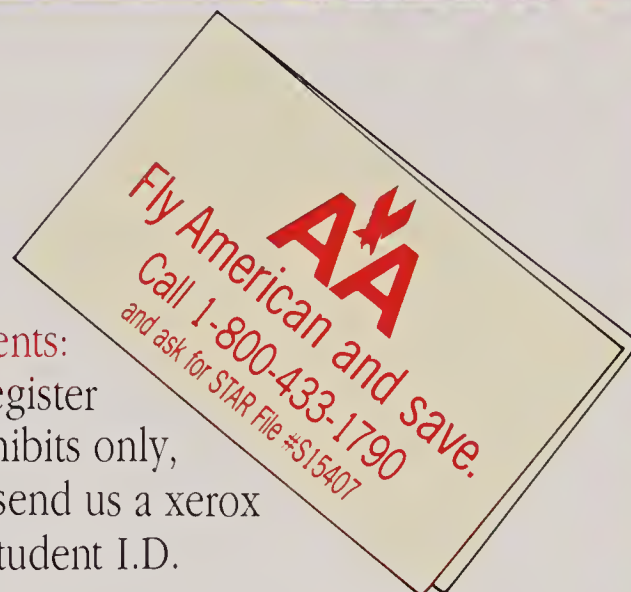


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Pictured are Orange Micro's C/Mac/GS Grappler and Applied Creative Technology's Printer Optimizer.

buffer. In an office in which many computers must be interfaced to several different printers, this product would pay for itself. My limited test application—driving a parallel-interface daisy wheel—produced no glitches, but I certainly didn't push it to its fullest capacity as a sophisticated networking tool.

The Final Printout

If you have access to an ImageWriter and no one is trying to force you to use

something else, then you already enjoy a situation that makes most of the computing world weak with envy. Your System, drivers, hardware, and applications have all been designed conscientiously to work together, and harmony reigns.

If you need or want to use a non-Apple serial printer, you're well covered by software solutions, although you should note that Mac application designers have been known to employ output tricks that demand 100 percent ImageWriter-compatibility.

If you want to drive a parallel printer from the Mac's serial port, you'll currently find two simple hardware fixes available. If one of them works perfectly with the applications you need (you should try to test this before making a decision), your problems are over. If not, they've just started. You then need to examine combinations of software with serial-to-parallel converters. For a large office with complex printing requirements and a mix of computers, this may prove to be the most satisfactory solution in the long run, despite a formidable technical effort at the outset.

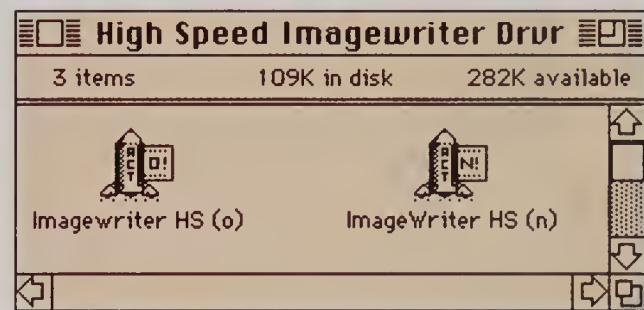


Figure 3

If you are forced to go to a serial-to-parallel converter box with a buffer, you will find that the rocket icons for the Printer Optimizer's software for the ImageWriter are not false advertising—your ImageWriter will zip along at nearly four times its standard speed.

Although 24-pin printers are gaining in popularity, slightly less expensive laser printers will probably represent the bigger trend in the next five years. For the time being at least, only the small percentage of Mac users who are completely dissatisfied with their ImageWriters or who must share printers in an office peopled with PC users should take on the task of hooking up to a non-Apple printer. □

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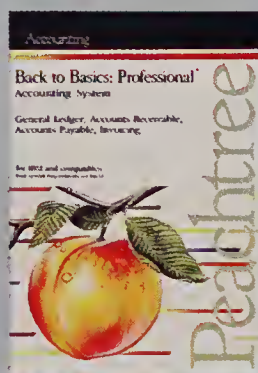
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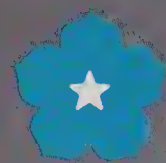
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Updates

This list brings you the highlights of software updates recently received but not yet tested. The first price is the upgrade cost for registered owners; the second is the current list price.

Alchemy version 1.1 adds the Roland S-550, Casio FZ-1, and FZ-10 samplers to the network of supported samplers. It supports the Sequential Circuits Prophet 2000/2002, Oberheim DPX-1, and Yamaha TX16W via MIDI sample dump standard. Compatible with Apple-CD SC and Optical Media's International CD ROM Digital Sound Series. Blank Software, P.O. Box 6561, San Francisco, CA 94101, 415/863-9224. Free; \$495 new.

Comment version 2.0 is MultiFinder compatible; faster and more memory efficient than earlier versions. Program is customizable, has built-in "Demo" feature. Can be configured to save changes automatically. Does not need to be open for a Time Note reminder to appear on the screen. Deneba Software, 7855 N.W. 12th St., #202, Miami, FL 33126, 305/594-6965. Free if purchased after January 31, 1988, otherwise \$17; \$99.95 new.

Fast Forms version 1.2 imports files using comma- or tab-delimited formats and supports maximum page size of 11 by 17 inches. Shana

Corp., 9650 20th Ave., #105, Edmonton, Alberta, Canada T6N 1G1, 403/463-3330. \$25; \$149 new.

HyperDA version 1.1 supports more HyperTalk commands, variations of background in HyperTalk, and features phone-dial function. Shows all custom fonts and icons in stacks, adds text justification in button names, and provides the ability to edit text within the message box. Browses and retrieves text/graphics information from HyperCard stacks; includes three custom dialing stacks. Symmetry Corp., 761 E. University Dr., Mesa, AZ 85203, 602/844-2199. \$10 with return of original disk; \$69 new.

Inside Out Multiuser version 1.2 supports multiuser environment, aids in design and implementation of stand-alone applications. Provides ready-made data-management system; includes controlled file- and record-locking, plus inter-application messaging. Shana Corp., 9650 20th Ave., #105, Edmonton, Alberta, Canada T6N 1G1, 403/463-3330. \$200 for registered single users of Inside Out; \$595 new.

KidsTime version 1.2 is MultiFinder and Mac II compatible (including speech). Start-up configuration option on all programs. Optional alphabet bar at bottom of screen in the letter-recognition game AB-Key; additional help options and click-drag option in Match-it for

moving puzzle pieces. Also features new rewards in Match-it; enhanced puzzle editor for Dot-to-Dot; on-screen Read All button and availability of longer stories in Story Writer. Great Wave Software, 5353 Scotts Valley Dr., Scotts Valley, CA 95066, 408/438-1990. \$15; \$49.95 new.

LabVIEW version 2.0 adds graphics to automate data acquisition, analysis, and presentation. Offers a compiler and support for multiple numeric formats, Clipboard cutting and pasting, multiple object selection, and dragging between windows for prototyping. Runs approximately ten times faster than 1.2. National Instruments, 12109 Technology Blvd., Austin, TX 78727-6204, 512/250-9119. Free; \$1995 new.

MacDesigner version 2.0 adds global data dictionary, which defines all relationships in your software system; includes features to connect data dictionary with structure chart diagrams. Supports large structure charts. Six types of windows; graphics- and text-editing features. Excel Software, P.O. Box 1414, Marshalltown, IA 50158, 515/752-5359. \$297 with original disk ID number; \$795 new.

(continues)

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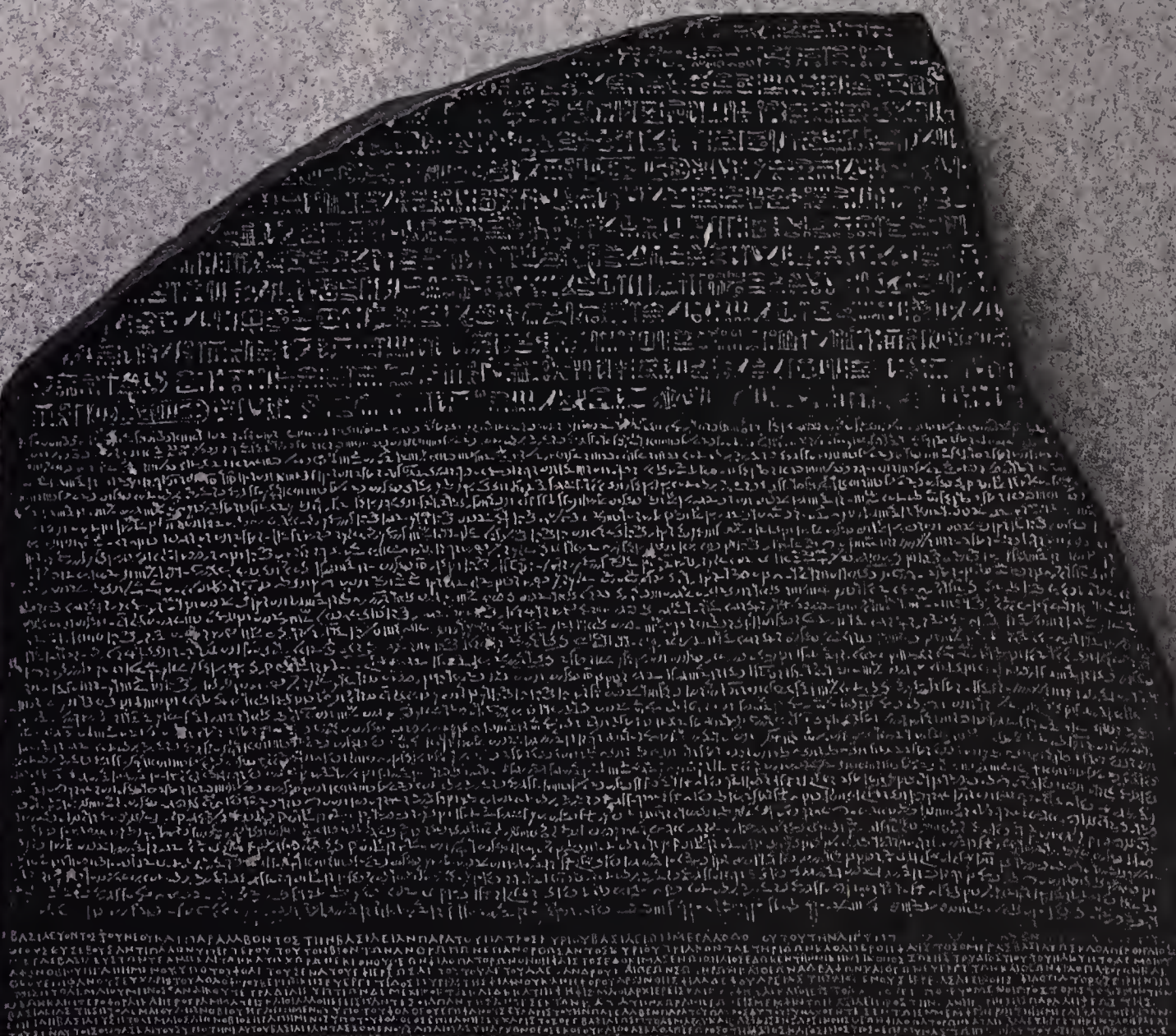
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4	1,033.13	677.91	355.22	73,598.35
5	1,033.13	674.65	358.48	73,239.87
6	1,033.13	671.37	361.76	72,878.11
7	1,033.13	668.05	365.08	72,513.03
8	1,033.13	664.70	368.43	72,144.60
9	1,033.13	661.33	371.80	71,772.80
10	1,033.13	657.92	375.21	71,397.59
11	1,033.13	654.48	378.65	71,018.94
12	1,033.13	651.01	382.12	70,636.82
13	1,033.13	647.50	385.63	70,251.19
14	1,033.13	643.97	389.16	69,862.03
15	1,033.13	640.40	392.73	69,469.30
16	1,033.13	636.80	396.33	69,073.97
17	1,033.13	633.17	399.96	68,675.01
18	1,033.13	629.50	403.63	68,273.38
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Updates

MacNail version 2.2 adds small-business accounting to the construction estimating and scheduling features of MacNail. Includes General Ledger, weekly payroll reports, and Quick Query features. Provides macros that track costs for individual projects at various levels of detail; linked to Turtle Creek Software's Quick Estimator. Turtle Creek Software, 651 Halsey Valley Rd., Spencer, NY 14883, 607/589-6858. \$15; \$295 new.

MSFL: Pro League Football version 2.0 supports LaserWriter and Image Writer. Has multiple speed variations and audible play calling; lets you make halftime adjustments to the game plan. Keeps statistics for individual players and teams; compiles seasonal statistics. Micro Sports, Inc., P.O. Box 15799, Chattanooga, TN 37415, 615/870-9735. Free with return of version 1.0 disks if purchased after August 1988, \$15 otherwise; \$49.95 new.

On Schedule version 2.0 allows users to vary selling schedules, permits a specified amount of working capital to be held as reserve, and accommodates budget amounts for various line-item expenses. RealData, 78 N. Main St., South Norwalk, CT 06854, 203/255-2732. Free if previous version bought after February 1, 1988, \$30 otherwise; \$195 new.

PacerLink version 5.0 allows Mac to concurrently interact with multiple VAX sessions via multiwindow terminal emulation and user interface. Windows can be moved, stacked, sized, scrolled, panned, and zoomed. Includes the ability to map VT terminal attributes to

colors on a Mac II and displays 132-column format on screen. Uses standard AppleTalk. Pacer Software, 7911 Herschel Ave., #402, Westborough, MA 01581, 508/898-3300. Free to customers with maintenance agreement; otherwise \$2000 and up per VAX (includes Mac software).

PICT Detective version 2.0 for Mac programmers works with third-party compilers such as LightspeedC and Turbo Pascal. Can open a PICT document or paste a picture from the Clipboard into a new document. Displays the picture in one window with description of picture element in another (description provides permanent record of picture's contents). Palomar Software, Inc., 2964 Ocean-side Blvd., Suite E, P.O. Box 120, Oceanside, CA 92054, 619/721-7000. \$20; \$125 new.

Sound Designer Universal version 1.3 has all previous samplers and Ensoniq EPS (MIDI and SCSI), Korg DSM-1, Roland S-550 and S-330, and Yamaha TX 16W. Transfers sounds between all the samplers. Digidesign supports. Digidesign, 1360 Willow Rd., #101, Menlo Park, CA 94025, 415/327-8811. \$45; \$395 new. □

To have products listed in this section, send upgraded software, an outline of major changes since the previous release, upgrade price, suggested retail price, company name, mailing address, and phone number to Updates, Macworld, 501 Second St., San Francisco, CA 94107.

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Statistics Basic statistics, frequencies, t-tests, post-hoc tests Multiway crosstabs with log-linear modeling, association coefficients, PRE statistics, asymptotic standard errors

Nonparametric statistics (sign, Runs, Wilcoxon, Kruskal-Wallis, Friedman two-way ANOVA, Mann-Whitney U, Kolmogorov-Smirnov, Lilliefors, Kendall coefficient of concordance) Pairwise/listwise missing value correlation, SSCP, covariance, Spearman, Gamma, Kendall Tau, Euclidean distances

Linear, polynomial, multiple, stepwise, weighted regression with extended diagnostics Multivariate general linear model includes multi-way ANOVA, ANOCOVA, MANOVA, repeated measures, canonical correlation Principal components, rotations, components scores Multidimensional scaling Multiple and canonical discriminant analysis, Bayesian classification Cluster analysis (hierarchical, single, average, complete, median, centroid linkage, k-means, cases, variables) Time series (smoothers, seasonal and nonseasonal ARIMA, ACF, PACF, CCF, transformations, Fourier analysis)

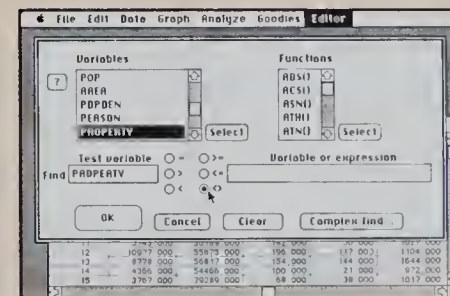
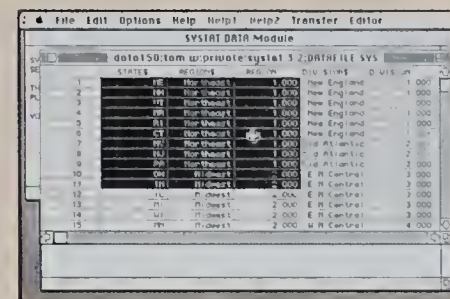
Nonlinear estimation (nonlinear regression, maximum likelihood estimation, and more).

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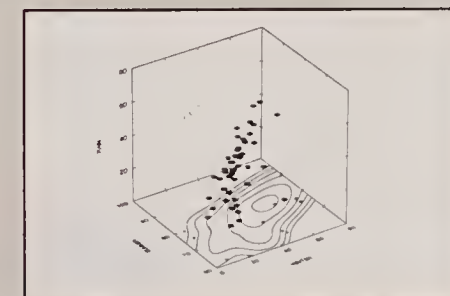
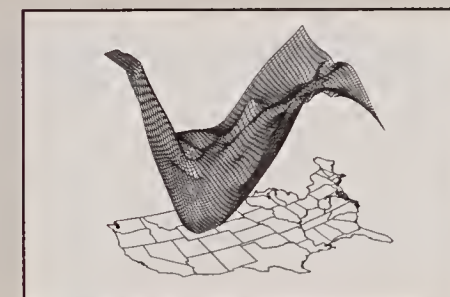
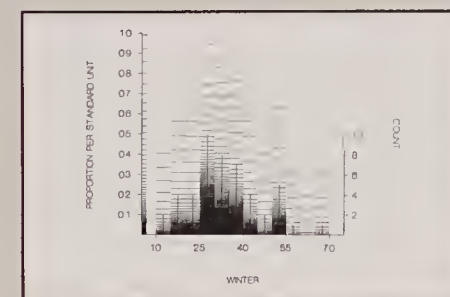
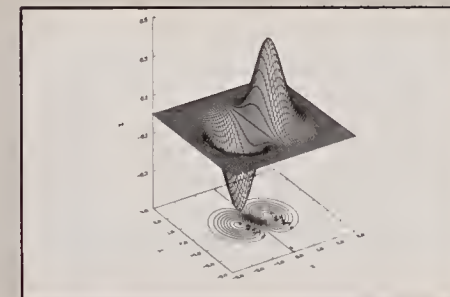
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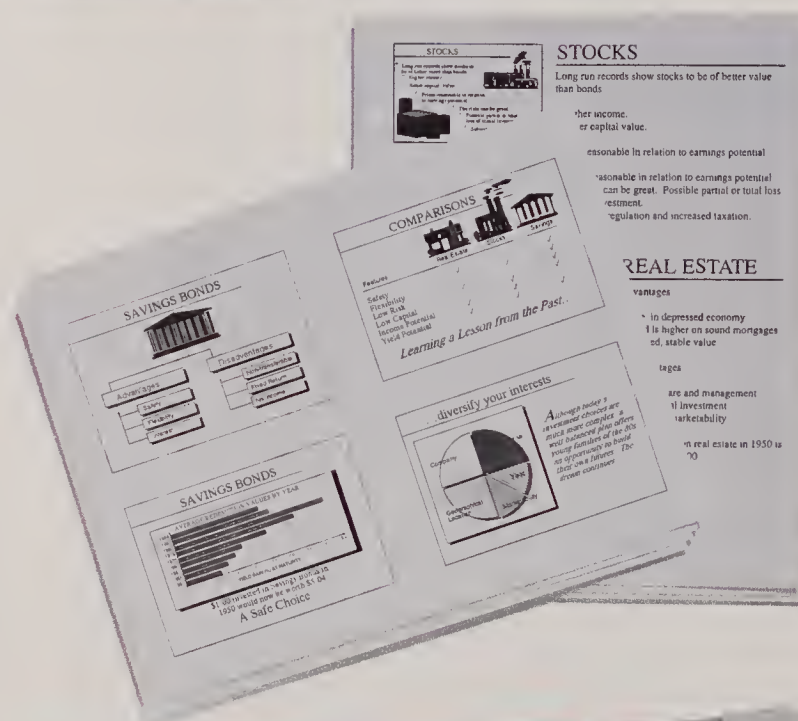
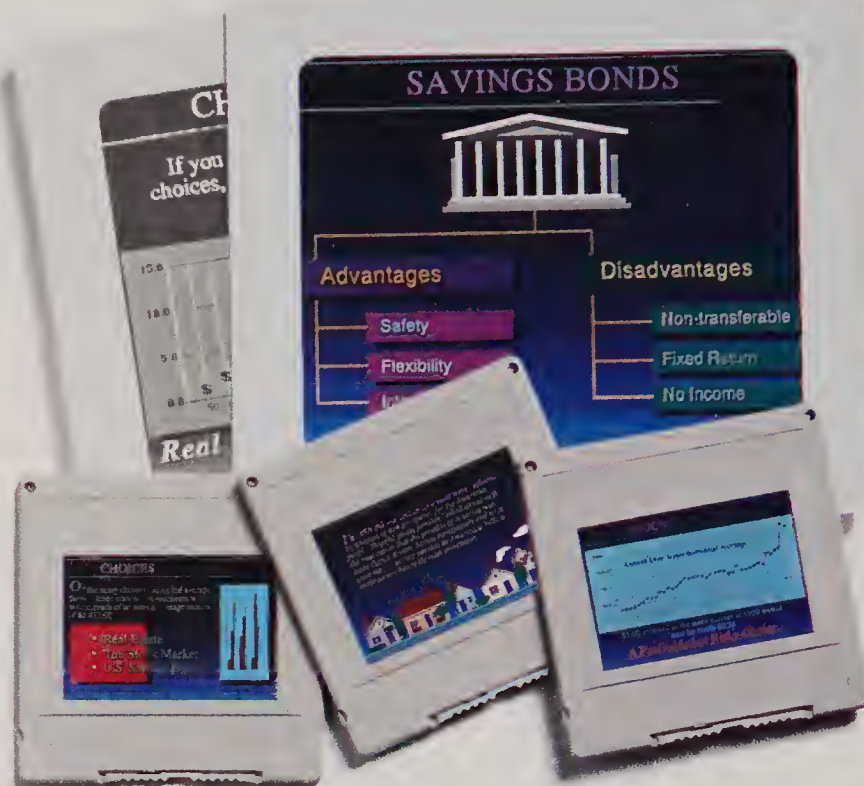
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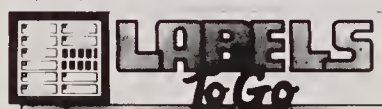
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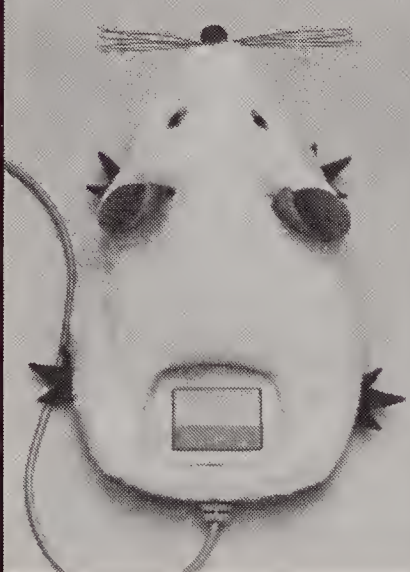
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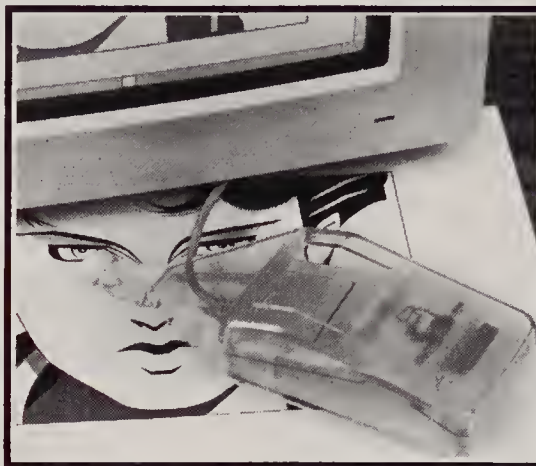
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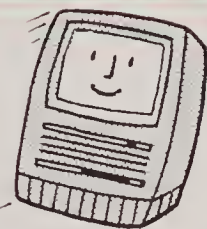
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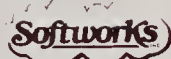
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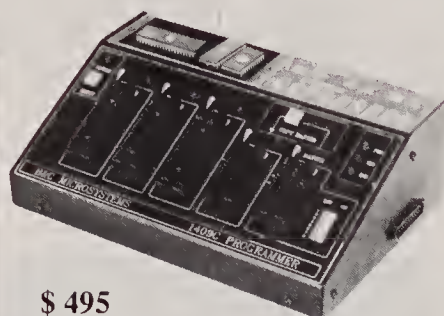
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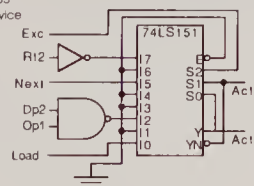
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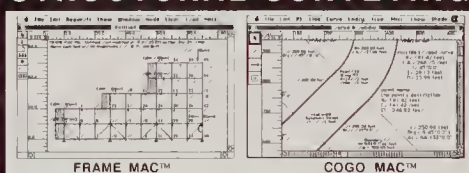
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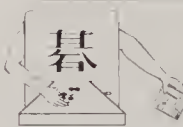
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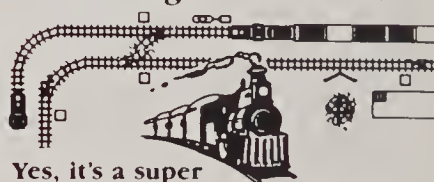
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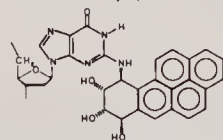
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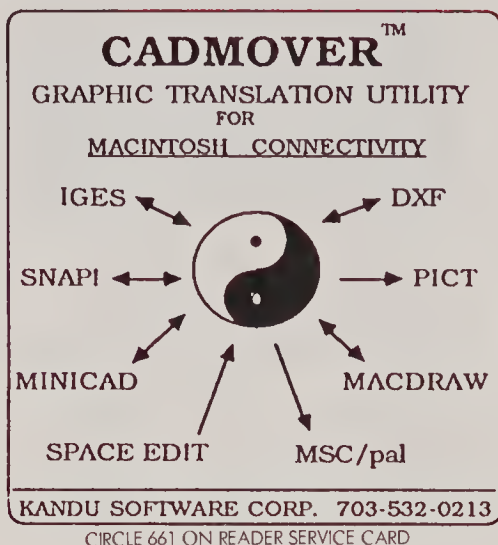
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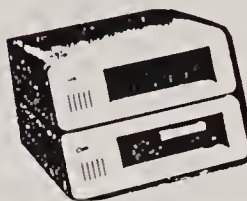
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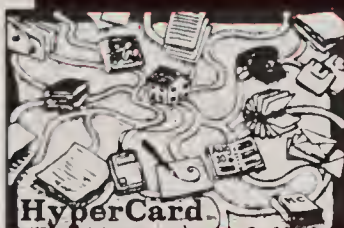
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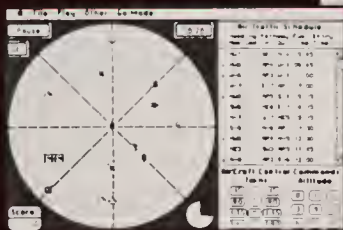
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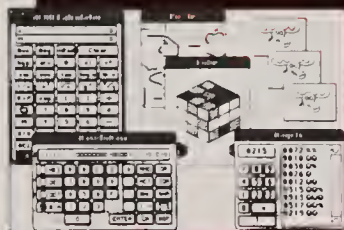
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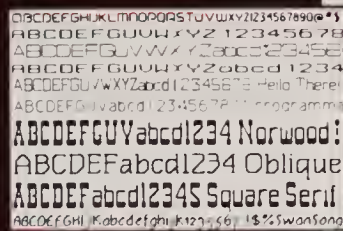
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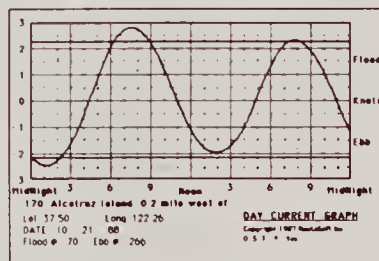
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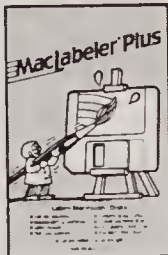
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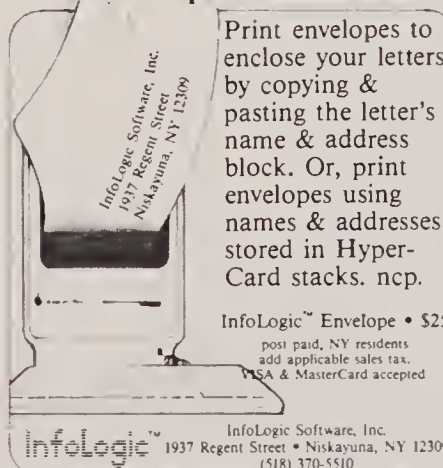
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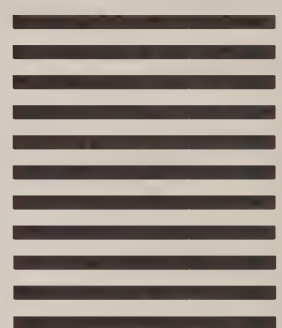
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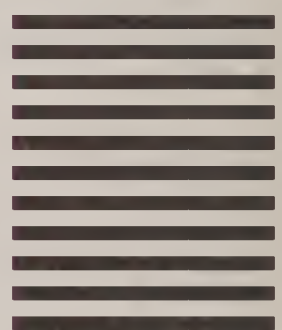
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Reader
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- * **APL-40T.** Advanced Digital Information Corp., 1437 N.E. 87th St., Redmond, WA 98073, 206/881-8004.
- * **APL-800WD.** Advanced Digital Information Corp., 1437 N.E. 87th St., Redmond, WA 98073, 206/881-8004.
- 751 **Apple Tape Backup 40SC.** Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010.
- 752 **AppleCD SC.** Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010.
- 753 **AUTO-SYNC 1019/SP.** Microvitec, Inc., 1943 Providence Ct., College Park, GA 30337, 404/991-2246.

B

- * **Bernoulli Box II.** Iomega Corp., 1821 W. 4000 S, Roy, UT 84067, 801/778-1000, 800/777-6654.
- 754 **Business Class.** Activision/Mediagenic, 3885 Bohannon Dr., Menlo Park, CA 94025, 415/329-0800.

C

- 755 **Copyrights, Trademarks & Patents.** Aardvark Development Labs, 14400 Ella Blvd., #150, Houston, TX 77014, 713/872-8085.
- 756 **Cricket Graph.** Cricket Software, Inc., 40 Valley Stream Pkwy., Malvern, PA 19355, 215/251-9890, 800/345-8112.

D

- 757 **Data File 40/150.** Giga Cell Systems, 4201 Burton Dr., Santa Clara, CA 95054, 408/727-1049, 800/832-8268.
- 758 **Data Pak.** Mass Micro Systems, Inc., 550 Del Rey Ave., Sunnyvale, CA 94068-3528, 408/522-1200, 800/522-7979.
- * **DataStream.** SuperMac Technology, 295 N. Bernardo Ave., Mountain View, CA 94043, 415/964-8884.
- 759 **DataWORM.** Giga Cell Systems, 4201 Burton Dr., Santa Clara, CA 95054, 408/727-1049, 800/832-8268.
- 760 **Direct Tape.** Jasmine Technologies, Inc., 1740 Army St., San Francisco, CA 94124, 415/282-1111.
- * **DiskFit.** SuperMac Technology, 295 N. Bernardo Ave., Mountain View, CA 94043, 415/964-8884.
- * **DPI 44R.** DPI, 40 Corning Ave., Milpitas, CA 95035, 408/945-1850, 800/825-1850.

E

- 761 **EMAC-60T.** Everex, 48460 Kato Rd., Fremont, CA 94538, 415/498-1111, 800/821-0806.
- 762 **Epson Serial Interface Card.** Hanzon Data, Inc., 22032 23rd Dr. SE, Bothell, WA 98021, 206/487-1717.
- 763 **Extend.** Imagine That, Inc., 7109 Via Carmela, San Jose, CA 95139, 408/365-0305.

F

- 764 **FileMaker II.** Claris Corp., 440 Clyde Ave., Mountain View, CA 94040, 415/960-1500, 800/334-3535.
- * **5040/5080.** Irwin Magnetics, 2101 Commonwealth Blvd., Ann Arbor, MI 48105, 313/930-9000.
- 765 **FlexiDrive 10.** Giga Cell Systems, 4201 Burton Dr., Santa Clara, CA 95054, 408/727-1049, 800/832-8268.
- 766 **Focal Point.** Activision/Mediagenic, 3885 Bohannon Dr., Menlo Park, CA 94025, 415/329-0800.
- 767 **FullWrite Professional.** Ashton-Tate, 20101 Hamilton Ave., Torrance, CA 90502-1319, 213/329-8000.

G

- 768 **Grappler C/Mac/GS.** Orange Micro, Inc., 1400 N. Lakeview Ave., Anaheim, CA 92807, 714/779-2772, 800/223-8029.

H

- 769 **HyperTape.** General Computer Corp., 580 Winter St., Waltham, MA 02154, 617/890-0880, 800/634-9737.

I

- * **IBNC 60Mb Tape.** IBNC, 1919 E. Rummey, #317, Anaheim, CA 92805, 714/635-7825.
- 770 **Icon Factory.** Hyperpress Publishing Corp., P.O. Box 8243, Foster City, CA 94404, 415/345-4620.
- * **Infinity 10/Infinity 40 Turbo.** Peripheral Land, Inc., 47800 Westinghouse Dr., Fremont, CA 94538, 415/657-2211.

K

- 771 **Kurta IS/ADB.** Kurta Corp., P.O. Box 60250, Phoenix, AZ 85082-0250, 800/445-8782.

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- 772 **LD-T50/LD-T60.** Laser Optical Technology, 1803 Mission St., #403, Santa Cruz, CA 95060, 408/426-7171.
- 773 **Legacy of Graphic Design.** Graphicspan, P.O. Box 2111, Kingston, Ontario, Canada K7L 5J8, 613/384-4852.
- 774 **Lunar Rescue.** PCAL, 1304 Jefferson Hwy., Champlin, MN 55316, 612/427-4789.

M

- 775 **Mac Lock Security Kit.** Mac Products, 20231 San Gabriel Valley Dr., Walnut, CA 91789, 714/595-4838.
- * **MacBack 60.** Peripheral Land, Inc., 47800 Westinghouse Dr., Fremont, CA 94538, 415/657-2211.
- 776 **MacDraw II.** Claris Corp., 440 Clyde Ave., Mountain View, CA 94040, 415/960-1500, 800/334-3535.
- 777 **MacEnhancer.** SoftStyle, a division of Phoenix Technologies, 660 Kalaniana'ole Hwy., Honolulu, HI 96825, 808/396-6368.
- 778 **MacKablit.** Secure-It Inc., 18 Maple Ct., East Longmeadow, MA 01028, 413/525-7039, 800/451-7592.
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- * **Macstreamer.** Novastor, 31828 Village Center Rd., Westlake Village, CA 91361, 818/707-9900.
- * **MacTape/SCSI.** Blackhole Technology, 225 East St., Winchester, MA 01890, 617/721-7690, 800/227-1688.
- 780 **MacTell.** Baseline Inc., 838 Broadway, New York, NY 10003, 212/254-8235, 800/242-7546.
- 781 **MegaDrive 10/20.** Jasmine Technologies, Inc., 1740 Army St., San Francisco, CA 94124, 415/282-1111.
- 782 **MegaTrend/2.** Intecolor Corp., 225 Scientific Dr., Norcross, GA 30092, 404/449-5961.
- * **MicroDynamics MARS.** Micro Dynamics, Ltd., 8555 16th St., #802, Silver Spring, MD 20910, 301/598-6300, 800/634-7638.
- * **Microsoft Word.** Microsoft Corp., 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073-9717, 206/882-8080, 800/426-9400.
- * **Ministreamer Model 1054/1260S.** Qualstar, 9621 Irondale Ave., Chatsworth, CA 91311, 818/882-5822.
- * **Mirror 20MB.** Mirror Technologies, Inc., 2644 Patton Rd., Roseville, MN 55113, 612/633-4450.

N

- 783 **National Gallery of Art Laserguide.** The Voyager Company, 2139 Manning Ave., Los Angeles, CA 90025, 213/475-3524.
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P

- 784 **P/C Privacy.** MCTel Inc., 5070 Parkside Ave., #1300, Philadelphia, PA 19131, 215/879-3819.
- * **Packer.** Bobbing Software, 67 Country Oaks Dr., Buda, TX 78610, 512/295-5045.
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- 786 **PC Viewer Model PCV 6448C+2.** In Focus Systems, Inc., 7649 Mohawk St., Tualatin, OR 97062, 503/692-4968, 800/327-7231.
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- 787 **Printer Optimizer.** Applied Creative Technology, Inc., 10529 Olympic Dr., #101, Dallas, TX 75220, 214/358-4800.
- 788 **Printworks for the Mac.** SoftStyle, a division of Phoenix Technologies, 660 Kalaniana'ole Hwy., Honolulu, HI 96825, 808/396-6368.

Q

- 789 **QT-Mac40.** Tecmar, 6225 Cochran Rd., Solon, OH 44139-3377, 216/349-3377.

R

- 790 **Redux.** Microseeds Publishing, Inc., 4702 N. Hesperides Ave., Tampa, FL 33614, 813/878-2142.
- 791 **Retriever.** Exodus Software, 8620 Winton Rd., #304, Cincinnati, OH 45231, 513/522-0011.
- * **Ridge Reader MINT.** Fingermatrix, Inc., 30 Virginia Rd., North White Plains, NY 10603, 914/428-5441.

S

- 792 **Safeware.** The Insurance Agency Inc., 2929 N. High St., Columbus, OH 43202, 800/848-3469.
- * **Sentinel.** SuperMac Technology, 295 N. Bernardo Ave., Mountain View, CA 94043, 415/964-8884.
- 793 **Spectra 60 Plus.** Spectra Micro Development, P.O. Box 41795, Tucson, AZ 85717, 602/884-7402.
- * **ST-60/ST-150.** MacPeak Systems, 1201 Spyglass, Austin, TX 78746, 512/327-3211, 800/225-7509.
- 794 **Super 3D.** Silicon Beach Software, Inc., P.O. Box 261430, San Diego, CA 92126, 619/695-6956.
- 795 **SupraModem 2400.** Supra Corp., 1133 Commercial Way, Albany, OR 97321, 503/967-9075.
- 796 **Symantec Utilities for Macintosh.** Symantec Corp., 10201 Torre Ave., Cupertino, CA 95014, 408/253-9600.

T

- * **Tape 60 Plus.** Relax Technology, 3101 Whipple Rd., #22, Union City, CA 94587, 415/471-6112, 800/848-1313.
- 797 **TapeStack.** CMS Enhancements, Inc., 1372 Valencia Ave., Tustin, CA 92680, 714/259-9555.
- 798 **TeleNode.** DataSpace Corp., 185 Riviera Dr., Unit 9, Markham, Ontario, Canada L3R 5J6, 416/474-0113, 800/387-0492.
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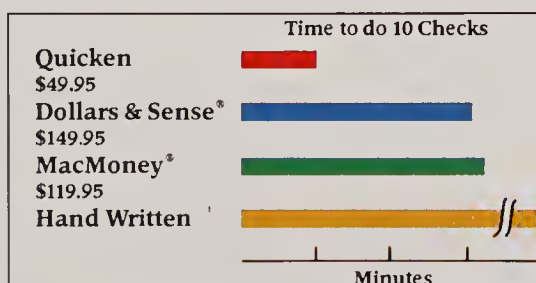
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Where to Buy

Reader
Service

- 800 **The Manhole.** Activision/Mediagenic, 3885 Bohannon Dr., Menlo Park, CA 94025, 415/329-0800.
- 801 **The Muzzle.** Ergotron, Inc., 1621 E. 79th St., Minneapolis, MN 55420, 612/854-9116, 800/328-9839.
- 802 **The NightWatch.** Kent Marsh Ltd., 1200 Post Oak Blvd., #210, Houston, TX 77056, 713/623-8618, 800/325-3587.
- 803 **The Print-Link.** GDT Softworks Inc., 4664 Lougheed Hwy., #188, Burnaby, BC, Canada V5C 6B7, 604/291-9121.
- * **The Sider T6.** First Class Peripherals, 3579 Highway 50 E, Carson City, NV 89701, 702/883-4000, 800/538-1307.
- 804 **Totem II.** Bering Industries, 240 Hacienda Ave., Campbell, CA 95008, 408/379-4300, 800/237-4641.
- 805 **2Gig.** Genius, 3958 Van Noorde, Studio City, CA 91604, 818/905-8866.
- U**
- 806 **Universal Printer Buffer.** Jonathon Freeman Designs, P.O. Box 880114, San Francisco, CA 94188, 415/822-8451.
- V**
- 807 **VideoTrax.** Alpha Micro Systems, 3501 W. Sunflower Ave., Santa Ana, CA 92704, 714/957-8500.
- W**
- 808 **Where in the World Is Carmen Sandiego?** Brøderbund Software, Inc., 17 Paul Dr., San Rafael, CA 94903-2101, 415/492-3200.
- 809 **WordPerfect.** WordPerfect Corp., 1555 N. Technology Way, Orem, UT 84057, 801/225-5000, 800/321-4566.
- 810 **WORM-800.** Laser Optical Technology, 1803 Mission St., #403, Santa Cruz, CA 95060, 408/426-7171.
- X**
- * **XTP 40/XTP 60.** Micah Storage Systems, 60 N. College Ave., Ste. B, Newark, DE 19711, 302/731-0430, 800/782-0097.
- Y**
- 811 **Your Faithful Camel.** The Voyager Company, 2139 Manning Ave., Los Angeles, CA 90025, 213/475-3524.
- Z**
- 812 **Zhonghua.** Cathay Europa Trading Company, P.O. Box 599A, Biddeford, ME 04005, 207/967-5358. □

Public domain software and shareware are available through online information services; user groups (call 800/538-9696 ext. 500 for information on a local user group); or mail-order clearinghouses such as Budgetbytes (800/356-3551 for orders, 913/271-6022 in Kansas), Educomp (800/843-9497, 619/259-0255 in California), or the Public Domain Exchange (800/331-8125, 408/496-0624 in California).



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Macworld Best-Sellers

Months on chart	Last month	This month	
Business Software			
41	2	1	Microsoft Word <i>Microsoft</i>
33	3	2	Microsoft Excel <i>Microsoft</i>
21	1	3	Microsoft Works <i>Microsoft</i>
29	4	4	PageMaker <i>Aldus</i>
2	—	5	WordPerfect for the Macintosh <i>WordPerfect</i>
2	8	6	Adobe Illustrator <i>Adobe Systems</i>
19	9	7	SuperPaint <i>Silicon Beach Software</i>
8	—	8	WriteNow for Macintosh <i>T/Maker</i>
5	—	9	Cricket Draw <i>Cricket Software</i>
5	10	10	Cricket Graph <i>Cricket Software</i>

Education Software

9	1	1	Reader Rabbit <i>The Learning Company</i>
21	—	2	Typing Tutor <i>Simon & Schuster Computer Software</i>
25	2	3	Math Blaster <i>Davidson & Associates</i>
24	5	4	KidsTime <i>Great Wave Software</i>
9	—	5	MacEdge II <i>Think Educational Software</i>

Entertainment Software

25	1	1	MacGolf <i>PCAI</i>
7	4	2	Falcon <i>Spectrum HoloByte</i>
25	2	3	Flight Simulator <i>Microsoft</i>
5	5	4	Beyond Dark Castle <i>Silicon Beach Software</i>
21	3	5	Dark Castle <i>Silicon Beach Software</i>

Networking/Data Communications

20	1	1	TOPS <i>TOPS</i>
17	2	2	AppleShare <i>Apple Computer</i>
12	4	3	PhoneNet <i>Farallon Computing</i>
25	3	4	LocalTalk (formerly AppleTalk) <i>Apple Computer</i>
16	—	5	MacTerminal <i>Apple Computer</i>

Months on chart	Last month	This month	
Hard Disks*			
1	—	1	MacStack SD 30 <i>CMS Enhancements</i>
6	—	2	MacStack SD 20 <i>CMS Enhancements</i>
1	—	3	DataFrame 30/XP30 <i>SuperMac Technology</i>
1	—	4	Rodime 100 Plus <i>Rodime</i>
3	—	5	Rodime 45 Plus <i>Rodime</i>

Add-in Boards

12	1	1	Radius Accelerator <i>Radius</i>
6	—	2	Macintosh II Video Card <i>Apple Computer</i>
6	4	3	Video Board/Large Screen <i>Ryad</i>
12	3	4	Apple 2MB Memory Expansion Kit <i>Apple Computer</i>
12	2	5	Apple 1MB Memory Expansion Kit <i>Apple Computer</i>

Product Watch

Editors' choice: Other recent or forthcoming products of particular interest.

HyperScan *Apple Computer* scanner software

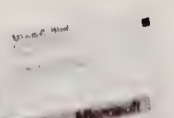
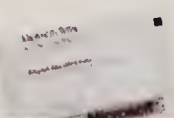
Mathematica *Wolfram Research* math analysis software

PhotoMac *Avalon Development Group* color image processing program

Source: Exclusive InfoCorp survey of more than 125 Macintosh retailers and selected mail-order suppliers. Covers sales during July 1988.

* Does not include hard disks installed at the factory.

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	WriteNow 2.0	MacWrite 5.0	MS Write	MS Word 3.01
Spelling checker size	100,000 words	100,000 words	80,000 words	80,000 words
Font size range	4-127 pts.	7-24 pts.	7-72 pts.	2-127 pts.
Maximum recommended document size (in pages)	Over 2,000	240	50	500
Number of open documents	Unlimited *	1	30	30
Mail merge	Yes	No	No	Yes
Number of editable, on-screen columns (WYSIWYG)	4	1	1	1
On-screen auto-numbering footnotes	Yes	No	No	No
Automatic repagination	Yes	Yes	No	No
Graphics in same line as text	Yes	No	Yes	Yes
Multiple headers and footers	Yes	No	No	Yes
Extensive Undo	Yes	No	No	No
Variable line spacing (in points)	Yes	No	No	Yes
Selective font, size, style, and ruler changes	Yes	No	No	Yes
MacUser Magazine's Best New Word Processor	Yes	No	No	No
Search for a word	2.4 sec	7.6 sec	9.5 sec	9.7 sec
Spell Check document	6.3 sec	2 min 34.0 sec	2 min 2.3 sec	1 min 48.0 sec
Copy & Paste large area	6.8 sec	1 min 0.9 sec	12.4 sec	12.3 sec
Change font size of document	10.7 sec	50.2 sec	17.6 sec	16.2 sec
Change font of document	10.8 sec	37.1 sec	14.1 sec	15.2 sec
'Save As' a 12-page document	3.6 sec	9.4 sec	20.3 sec	19.6 sec
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Happy Users	Yes	?	?	?



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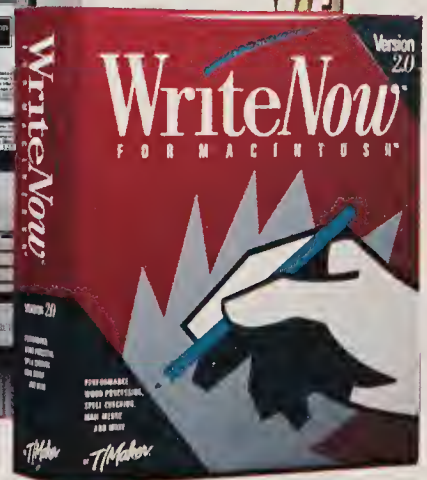
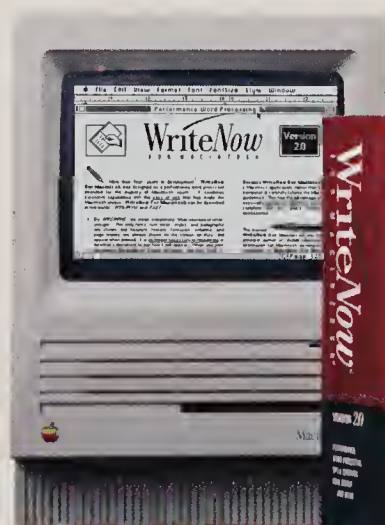
How do we know? Because our users tell us—on registration cards, on the telephone, on bulletin boards, and in letters.

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All timing tests performed by an independent testing organization on a 12-page document using a Macintosh SE and a 20 megabyte hard disk.
* Number determined by Macintosh system constraints.

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